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THE WORTH OF WILDERNESS

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"AGAIN AND AGAIN the challenge to explore has been met, handled, and relished by one generation—and precluded to any other. Although Thomas Jefferson argued that no one generation has a right to encroach upon another generation's freedom, the future's right to know the freedom of wilderness is going fast. And it need not go at all. A tragic loss could be prevented if only there could be broader understanding of this: that the resources of the earth do not exist just to be spent for the comfort, pleasure, or convenience of the generation or two who first learn how to spend them; that some of the resources exist for saving, and what diminishes them diminishes all mankind; that one of these is wilderness, wherein the flow of life, in its myriad forms, has gone on since the beginning of life, essentially uninterrupted by man and his technology; that this, wilderness, is worth saving for what it can mean to itself as part of the conservation ethic; that the saving is imperative to civilization and all mankind, whether or not all men yet know it."

We have taken the liberty of quoting at length from David Brower's Foreword to *This is the American Earth*, because we could not hope to better it as a statement of why some of this planet's remaining wilderness has got to be saved. Space permits here, in addition, little more than our urgent plea to Academy members and other PD readers to look at, to read, if possible to own, this book by Ansel Adams and Nancy Newhall. If this issue of PD should—we hope it will—impel you to look deeper into this wilderness thing (even you for whom Golden Gate Park may be wild enough!), this extraordinarily beautiful book is, next to the wilderness itself, the best place we know to start looking. Not only is it a lavish, exquisitely designed and printed portfolio of some of the most strikingly beautiful, some of the most tellingly significant photographs ever made and assembled for any purpose; it has a text that reads like pure poetry and rings with urgent and prophetic truth. One is impelled to believe that the graphic combination cannot but move the most callous and instruct the most ignorant as well as inspire afresh the already receptive or convinced among those whose hands and eyes receive it. The Sierra Club has published this book (which had its genesis in an exhibit prepared in the California Academy of Sciences workshop) in the sure conviction, scientifically provable, that on the one hand wilderness preservation is a vital necessity, and that on the other ours is the last generation of men that will see any considerable amount of it to preserve. If we do not, we will have committed a crime against the earth and all future generations, staggering in its enormity and its implications. This is all there is. There isn't any more. It's up to us. (Please note this issue's outside back cover.)

OUR CONSERVATION EDITOR, Dr. A. Starker Leopold, is Professor of Zoology at the University of California, Berkeley, and President of the California Academy of Sciences. . . . ¶Thanks to Dr. Leopold for introducing to our pages a young teaching assistant in his department, Richard E. Warner, whose Mauna Kea story is a result of his own careful field work. . . . ¶Landscape designer Ben Ehrlich lives in San Francisco but is much concerned at the way suburban development is eating up more and more of our characteristic California landscape. . . . ¶At the time of writing, E. S. Taylor was cooperating with the Department of Anthropology of the University of Southern California. Through oversight, the photos of the Reid Adobe story were not credited *in situ* to the author, whose home address is Redondo Beach, California. . . . ¶Dr. Arthur C. Smith, PD nature editor, is Professor of Biology at Alameda State College, Hayward. . . . Astronomy editor George W. Bunton is Manager of the Alexander F. Morrison Planetarium at the California Academy of Sciences.

PRE-DISCOVERY

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THE COVER

A DEAD TREE surrounded by young new growth symbolizes the eternal cycle of nature which only in a wilderness turns free and unaffected by "civilized" human demands. Photo taken in the Grand Teton Range, Wyoming, by Philip Hyde.

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A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD



EDITORIAL

Save Our Remaining Wilderness

AMERICA is proud of its frontier heritage. We commemorate the pioneers with monuments and speeches; we teach our children respect for the mountain men who traded in beaver pews and the intrepid settlers who first drove a plow into the tough prairie sod. Conquest of the wilderness was a dramatic first step in our cultural development as a nation.

But with this stage long past, many people now attach increasing importance to preserving the scattered remnants of wilderness, which, for one reason or another, have escaped the heel of progress. Wilderness, a commodity that once was all too abundant, has suddenly become all too scarce. Recreationists swarm from the cities seeking repose in wild country. Conservationists are pressing Congress to establish a system of national wilderness areas. The public at large is showing a surprising interest in wilderness preservation. What are the considerations that might justify calling a halt to the "inexorable" encroachment of civilization into the last pockets and crannies of unexploited landscape?

From the standpoint of general public interest, the opportunity to partake of unmotorized, wilderness-type recreation would seem to be the primary issue. An increasing proportion of the vacationing public is taking to the back country with knapsack, burro, or mule train to escape the crowds along the roads. This quest for solitude is reaching such proportions near centers of population that there is danger of its becoming self-defeating. In one sector of the High Sierra Wilderness in California recent figures indicate seasonal use in excess of one man-day per two acres. One wonders how long this area can be considered "wilderness" despite its roadless character.

But the interest of the public in wilderness preservation goes far beyond those who actually participate in its enjoyment. There is abundant evidence that most Americans want some country kept wild even if they have no real expectation of ever getting there. This is best exemplified by a recent referendum in the state of New York regarding preservation of the Appalachian Forest Preserve in wilderness status. A solid

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Magic Mountain, Northern Cascades. (Ansel Adams, courtesy of the Sierra Club)

majority voted to maintain the integrity of the wilderness blocks within the Preserve and to exclude roads, reservoirs, or other developments. Yet the figures show that of the 15,000,000 people in the state only about 1,000,000 annually visit the roadside camps in the developed portions of the Preserve, 100,000 hike along the trails and utilize the prepared hostels and shelters, and a mere 10,000 go into the wilderness proper to build their own camps. A fraction of one per cent of the people use the wilderness but a majority will vote to save it. Strong support is manifest in the United States for preservation of the proposed Arctic Wildlife Range in northeastern Alaska—a forbidding piece of country that few people will ever visit, now or in the distant future. Therefore in evaluating public interest in wilderness preservation we must list first the strictly sentimental feeling that saving some wild country is the right thing to do; much less impelling is the more selfish motive of personal enjoyment of its beauties.

There are other wilderness values of which the public is less aware. Some kinds of wildlife are more or less intolerant of disturbance by people and deserve solitude in their own right. The California condor is one such species. Reduced to the verge of extinction (there are fewer than 100 individuals), the species is persisting by virtue of protection of the nesting grounds near Santa Barbara in an inviolate wilderness sanctuary. Bighorn sheep, mountain goat, and grizzly bear all require big blocks of undeveloped country.

Wilderness has potential scientific value that is difficult to measure at this stage of affairs. Ecologists know that soil fertility and productivity are conditioned by the complex community of plants and animals that live on and in the ground. When resources are exploited by grazing, logging, or other means the community is altered with possible detrimental effects on the soil. Even on the best managed wild lands, problems may arise in the future that will require study. Some of the most carefully tended forests in Germany—models of silvicultural efficiency—in time developed sour soil and declining yields. We have no assurance that our recommended forest and grazing practices will guarantee self-sustaining forests and range lands. Some day we may want to analyze how the wild community of plants and animals keeps the soil "healthy." Wilderness areas, representing all the major ecologic types in the country, will be the sites of such study and sources of organisms whose importance we certainly do not recognize today.

Despite the acknowledged values of wilderness—recreational, esthetic, and scientific—there are many problems in defining a clear national policy for wilderness preservation and in putting this policy into practice. The National Park Service professes the desire and intent of preserving the bulk of the larger parks and monuments in wilderness status; but pressure from the motorized public for more roads and camp grounds is inducing a gradual retreat of the wilderness frontier, even in these dedicated areas. The Forest Service has formally established a set of wilderness, wild, and primitive areas in the national forests, but pressures to shrink the borders continue to be

heavy, especially where there are valuable resources to be exploited. Everyone is content to leave the rocky peaks in wilderness status. But the well vegetated lower slopes are eyed with interest by the loggers and livestock graziers. These areas, of course, are the most interesting scientifically and have high recreational and esthetic values too. The choice of where to set the final boundaries is still a matter of subjective judgment. There are wilderness blocks on other public lands as well—on Indian reservations, national wildlife refuges, the unallocated public domain, and on state-owned lands. Several government bureaus, each with its own problems, will have to participate in developing a true national wilderness system.

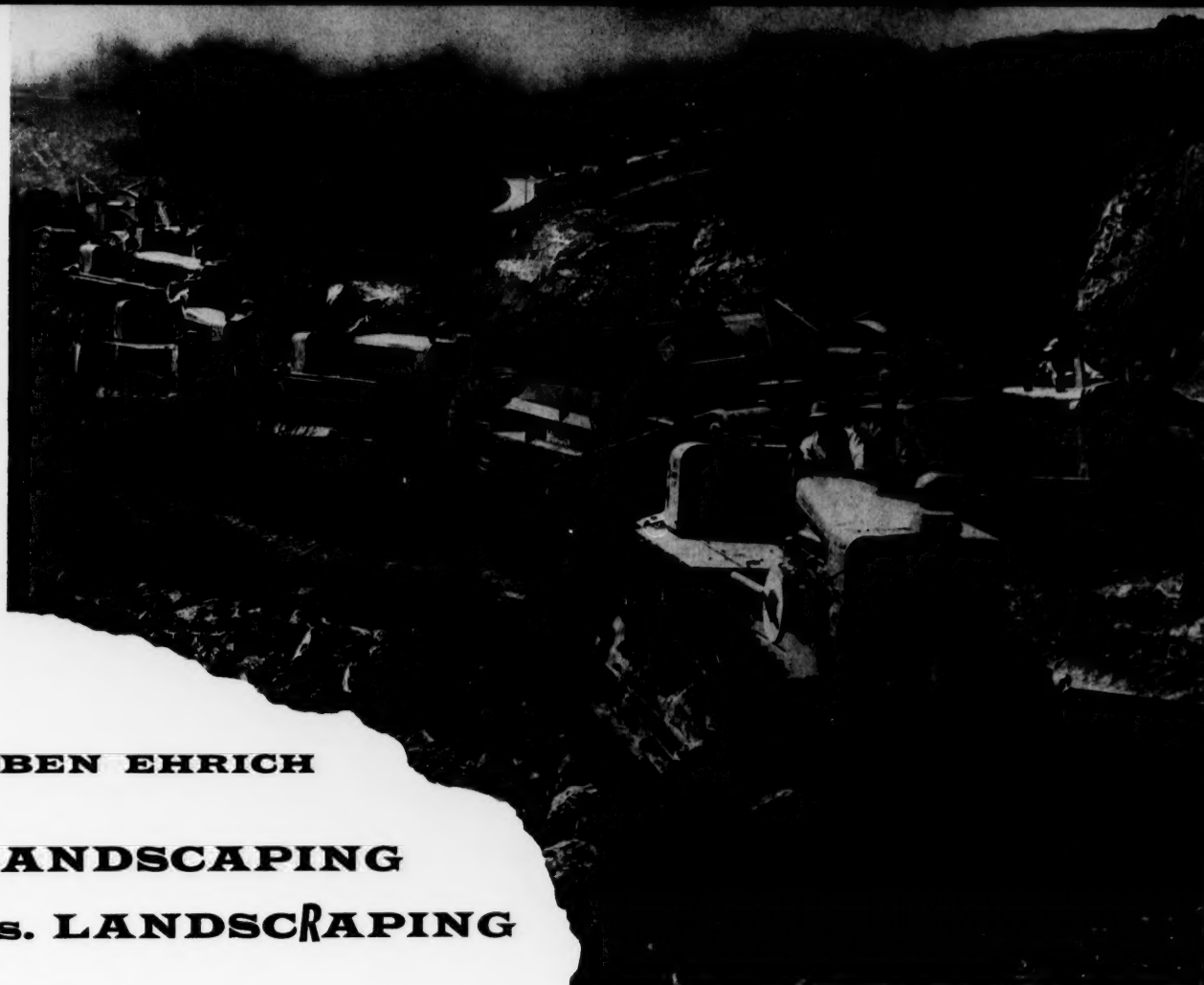
Even if and when all the bureaus and agencies, and the United States Congress, agree to the establishment of an ample system of wilderness preserves, there will remain some difficult problems of administration and management. What should be the policy regarding protection of the wilderness forests from fires, insects, and plant diseases? The natural vegetation developed and persisted without protection from anyone. Some areas were subject to running ground fires regularly—a factor which kept the stands open and park-like. Should we now send bulldozers and truckloads of men into the wilderness to extinguish these blazes? In so doing we bring machines into dedicated roadless areas and at the same time change the forest from a sparse to a dense stand, much more vulnerable to damage by future fires.

Some game animals cause problems too. In many areas indiscriminate control of the large predators has permitted the herds of deer and elk to grow in numbers beyond what the ranges will support. To protect the vegetation, and the well-being of the animals themselves, many herds should be reduced; but most hunters are notoriously lazy about getting farther than a mile from the car. This leads to the paradoxical demand that roads be built into the wilderness so that hunters can harvest the game, thereby protecting the wilderness!

Even general recreational use has its difficult facets. Too many campers trample the mountain meadows, defile the countryside with litter, and create serious sanitary problems. Their pack stock may overgraze the grass. Should there be privies? Garbage pits? Horse corrals supplied with hay? Ranger stations to permit patrol and enforcement of regulations to protect the wilderness? If so, would it still be wilderness?

None of these problems is insurmountable, but we might as well acknowledge their being problems. There is much more to wilderness preservation than drawing a line on a map and issuing a proclamation.

At the moment, the most important issue concerns the disposition by Congress of the Wilderness Bill (S.1123; H. R. 1960). This legislation, if passed, will be important as a statement of national policy. Once the nation has expressed the intent to establish and perpetuate a national system of wilderness areas, the details of where to draw the ultimate boundaries of individual preserves and how to administer them can be worked out with sympathetic interchange of ideas between public and administration. A.S.L.



BEN EHRLICH

LANDSCAPING vs. LANDSCRAPING

PHOTOS BY PIRKLE JONES

TO SPEAK ABOUT LANDSCAPING is to arouse the interest of millions of Americans who now find themselves home owners and, by dint either of choice or of necessity, part-time gardeners. For some, especially those transplanted from city apartment living, it is a brand new experience opening whole new vistas fraught with varying amounts of adventure, satisfaction, and drudgery.

In order to get this familiar picture into focus, let us turn our thoughts for the moment to that holy of holies, the American front yard, and its opposite number, the back yard which now goes under the name of patio. Bravely, we will rush in where our best friends may fear to tread (even on Japanese stepping stones).

Take for example a quite common experience. You have seen some wonderful country in its natural state. You want a piece of it and you buy. It thrills you, this bit of land. Why? It has two or three marvelous trees. It has slope—the hill is covered with native plants and

grasses. It has *vitality*. You love it—you want to live there, to build your house on this very spot. Watch as the drama unfolds.

First Act: From left stage—enter the bulldozer. It crosses to front center stage, frothing at the mouth and tearing up everything in sight.

End of Act One finds the hilltop knocked off—for “building site.” All native plants gone. Drainage problems imminent as fill is thrown over—2,000 square feet of macadam plastered around for municipal-size family parking lot.

Second Act: Lightly constructed, heavily mortgaged house of dubious architectural merit rises on good earth.

Wife to Husband: “The place looks so bare. What shall we plant?”

Husband to Wife: “Well, dear, let’s call a landscaper.”

A whole truckload of exotic, socially secure horti-

cultural species arrive. They are planted and they grow.

Five years and 250 week-ends later it becomes suddenly apparent that our Marsha and John who have been toiling and spinning are now embroiled in a life-and-death fight against that monster called Nature. The garage has taken on the look of an operating room in a well stocked hospital—endless equipment, bottles, sprays (many marked poison), cutters, clippers, pruners, edgers, fertilizers, rollers, weeders, stakes, traps, twistems ad infinitum. Is this what the joy of living in the country is all about?

SOMEWHERE along the line we have lost the ability to see the land as it is. Instead, there are the so-called picturesque, theatrical scenes which are created in the name of landscaping. Thus unwittingly (and at great cost) we continue to destroy the particular quality of the terrain which has real meaning. We further chain ourselves in a constant battle against overwhelming odds where the final result is all out of harmony with the natural environment.

To look with insight upon one's native land is to find that it speaks its own language. There are always a number of plants and trees which have thrived unattended in any given locale and by their very adaptability give character to the scene. Because they are everywhere around us we tend to ignore them and seek out material which is foreign, inappropriate, and frequently ostentatious. Rather than allowing a place to blend into a larger landscape, we are inclined merely to prettify our plot.

In the rush to bring the outside in, there has arisen a boomerang action which has resulted in a kind of exterior decoration. It becomes an almost obsessive involvement in a process of rearranging, sweeping, and dusting the great out-of-doors as if it were a parlor.

As the scarcity and high cost of labor turns the problem of maintenance back upon the owners (who are already overwhelmed with the chores of house-keeping), one expedient and unhappy solution has appeared in the form of over-large areas laid low with paving materials. These are often foisted upon one enticingly with the lure of having "interesting textures" and "unusual forms." These surfaces are hard, reflective, and sometimes just plain ugly. Planter boxes hugging the houses complete the picture with their multicolor floral display resembling a necklace of flashy costume jewelry.

Aside from any esthetic judgments one may wish to make, the continued threat of water shortage is now a vital factor in our lives. Native plants and trees were designed to bridge the long hot summer. Our need for water is so critical, particularly in the West, that maintaining exotic plants which require extensive watering may become prohibitively expensive, even—in time—illegal.

As developers swallow up more and more of the dairy farms and orchards surrounding many of our cities, lovely hillslopes are being bulldozed into stepped flats for "ranch house" suburban homes. If a spreading oak stands where the blueprint calls for a street or house site, the oak turns into high-priced firewood.

New homes we must have. When the turn comes for this dairy ranch, why not plan with inviting nature, adapting to slope and tree—instead of destroying all natural beauty so generously provided for our enjoyment?

A house, its people, and the land on which it rests are a trinity. These things are important in creating a harmonious whole. The ideas and concepts by which we live are handed down to us as tradition and modified by our changing ways of life. In our time which is characterized by a technological surge (towards the conquest of nature), speed, and mass production, it is easy to see how certain stereotyped ideas have been stamped even into our gardens. Some of the results find their justification invoked in the name of science; but they are more likely than not to be the antithesis of any true science of the land.

No amount of clever landscaping can obscure a badly designed structure or restore a ruined site. It is vital that owner, architect, and landscaper all convene before the first twig is bent. It is to be prayerfully hoped that the architect will have a reverence for the land and that it will be the inspiring influence





in the design and material used in building. Never was there a medieval dragon that could possibly match the horror and havoc a 20th century bulldozer can wreak in an easy day's prow. Marvelous land contours, venerable stones, charming glades and dells, native plants and grasses are consumed by a blade that has no brain or heart.

America, often heralded as a cultural melting pot, has gone through many cycles of gardening style. Who cannot recall the various vogues—English, French, Italian, and more recently the fashionable swing to the Japanese garden. In a country as vast and varied as ours, each regional area with its own environmental demands serves as an ideal source of material and inspiration for a garden that can quietly echo the rhythm of its surroundings. To anyone who is sensitive to his native heath, the tight little stylish garden which demands so much care (and for which

the owner demands so much praise) is as appropriate to the out-of-doors as a crocheted doily. It is in effect an extension of the house walls, shutting out the larger scene.

Paraphrasing the familiar saying "the proper study of mankind is man": the proper study of landscaping is the land itself. By constantly being aware of the country in which one lives, by watching the randomness of the untutored land, and by observing with a loving eye the subtle and fascinating seasonal modulations, one comes to appreciate and marvel at nature's silent ways which are ever refreshing to our vision and our spirit.

No one has ever illumined the path with greater clarity or deeper insight than the gifted poet who began the 121st Psalm with:

*I will lift up mine eyes unto the hills
From whence cometh my help.*



A FOREST DIES ON MAUNA KEA



▲ Treeline above Puu Laau, 9,500 feet up the slope of Mauna Kea. Rocks, bare earth, and dead trees are all that remain of a once "highly picturesque and sublime" region. (All photographs by the author)

How Feral Sheep Are Destroying an Hawaiian Woodland

RICHARD E. WARNER

CONSERVATION

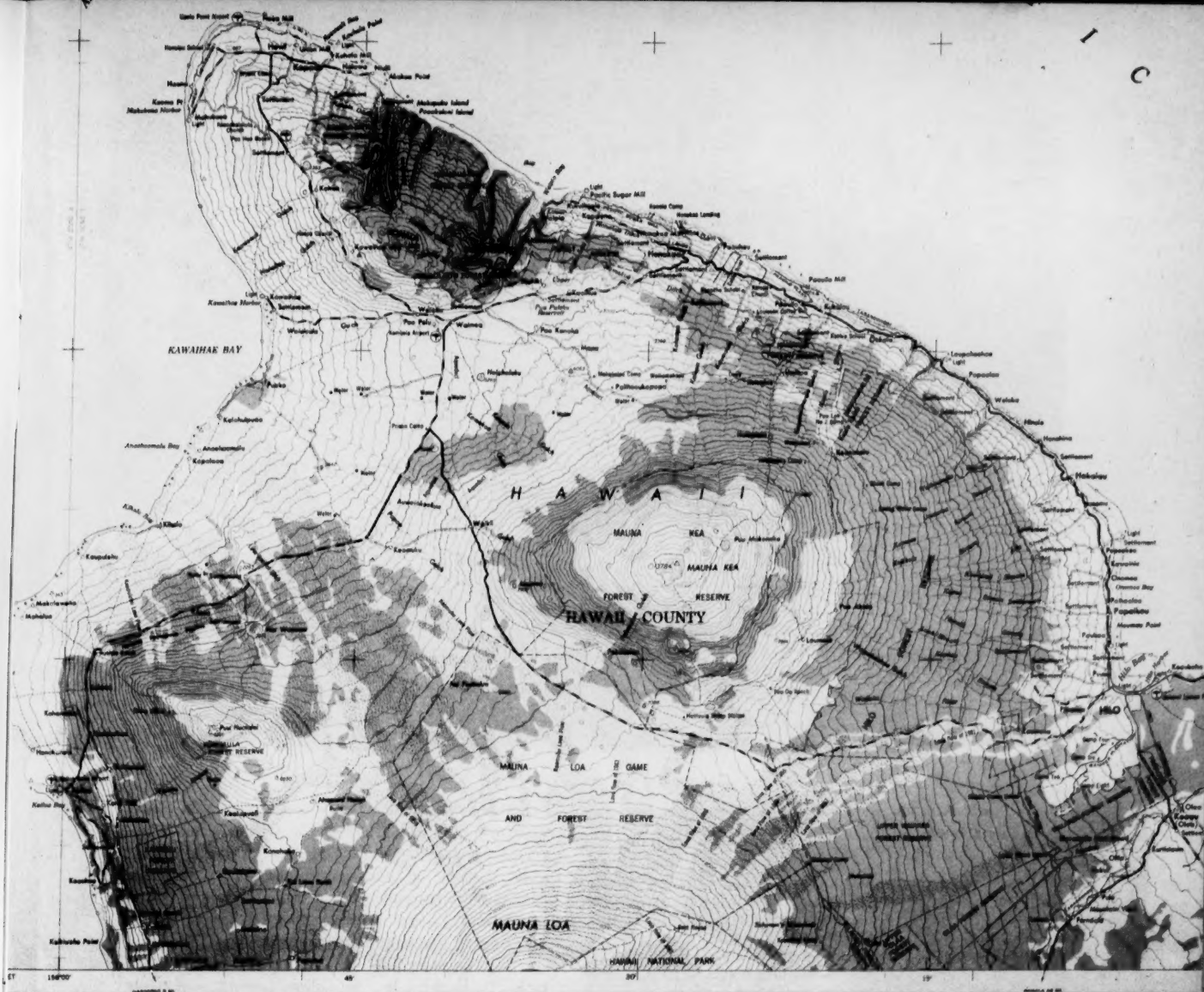
MAUNA KEA, highest of the great Hawaiian volcanic peaks, thrusts its cindercone- and lava-encrusted bulk 13,784 feet into the cold, thin upper air of the tradewind belt. Despite its proximity to the Equator (20° north latitude) the higher reaches of the mountain experience freezing nighttime temperatures the year around, and for months during the winter season snow hangs on the bare, windswept upper slopes.

The lower flanks of the great peak, especially on the windward sides between sea level and 6,000 feet elevation, are clothed by dense stands of native Ohia (*Metrosideros collina*), and Koa (*Acacia koa*) with a lush understory of several types of ferns and shrubs.

Rainfall is so heavy that the wild pig is the only mammal living here.

Above 6,000 feet the plant growth changes abruptly. The dense forest dwindles to a ragged edge, and is replaced by an open woodland of Mamane (*Sophora chrysophylla*), Koa, and in the drier regions Naio (*Myoporum sandwicense*) together with the associated understory shrubs and grasses. This open woodland continues up the slope to approximately 9,500 feet where it abruptly gives way to bare lava and cinder slopes dotted with Puakeawe (*Styphelia tameiameia*) shrubs.

Above 11,500 feet plant life all but ceases; an occasional silversword may be seen glistening in the alpine



sunlight, but even the hardy and tenacious Puakeawe finds the environment too rigorous.

Because of the many changes in the flora which have occurred over the century and a half following the introduction to the area of cattle, sheep, goats, and horses which ultimately multiplied to enormous populations, it may prove interesting to note some of the observations made by naturalists while Mauna Kea still retained much of its primeval appearance. The following are excerpts from the journal of the famous plant explorer David Douglas, who hiked into the area in 1834. The passage begins as he emerges from the Mamane forest above either Hilo or La Pahaeohoe on his way toward Mauna Kea's summit:

Jan. 7, 1834.—The wood terminates abruptly, but as the lodge of the cattle-hunter was still about a mile and a half farther up the clear flank of the mountain, situated on the bank of a craggy lava stream, I delayed ascertaining the exact altitude of the spot where the woody region ends (a point of no small interest to the botanist) [sic] until my return, and sate down to rest myself awhile, in a place where the ground was thickly carpeted with species of *Fragaria* (strawberry), some of which were in blossom, and a few of them in fruit.

—According to report, the grassy flanks of the mountain abound with wild cattle, the offspring of the stock left here by Captain Vancouver, and which now prove a very great benefit to this island.

Jan. 12, 1834.—The line of what may be called the Woody Country, the upper verge of which the barometer expresses 21.450 inch; therm. 46° at 2 pm (9,300 feet ±)

A Hawaii, northern part of the island. Shaded areas are forest and shrub cover. Stipple pattern denotes lava flows. Contour interval, 200 feet. (Part of USGS map "Hawaii North," edition of 1959; Hawaiian Islands 1:250,000 series; reduced here to approximately one half, or 1:500,000 [1.25 inches = 10 miles].)



is where we immediately enter on a region of broken and uneven ground, with here and there lumps of lava, rising above the general declivity to a height of three hundred to four hundred feet, intersected by deep chasms, which show the course of the lava when in a state of fluidity. This portion of the mountain is highly picturesque and sublime. Three kinds of timber, of small growth are scattered over the low knolls; with one species of *Rubus* (blackberry) and *Vaccinium* (huckleberry), the genus *Fragaria* (strawberry) and a few Gramineae (grasses), Filices (ferns), and some alpine species. This region extends to barometer 20,620 inches; air 40°, dewpoint 30° (10,500 feet \pm).

We know from his comments that botanist Douglas had knowledge of the growing populations of feral livestock, brought originally to the Islands around 1800 by Captains Cook and Vancouver, which abounded on the slopes of Mauna Kea. The Kapu (tabu) placed on the animals at the time of their initial introduction had just a few years previously been lifted, permitting Hawaiian commoners for the first time to take them for food. Perhaps fortunately for the botanist's peace of mind it was yet too early for even a trained eye to discern the evidences of overbrowsing and forest destruction which ultimately would become the hallmark of the exotic species.

The years passed and the introduced livestock populations, unhampered by predators and only oc-

asionally disturbed by man, multiplied with enormous rapidity. The weather was mild, the food supply only suggesting the first signs of exhaustion.

By the end of the nineteenth century the exotic species were beginning to eat themselves literally out of house and home. Food became less readily available, forcing the now huge populations of feral stock to travel considerable distances to find sufficient forage. The land too began to show symptoms of stress. Erosion gullies appeared. Flash floods began carrying away vast quantities of the fine, ashy topsoil. The Mamane forest commenced to take on a ragged, sickly appearance.

Around the turn of the twentieth century the upper portion of Mauna Kea was declared a "Forest Reserve" by the Board of Agriculture and Forestry, and incorporated into a territory-wide system designed to protect the forests from further abuse and effect their restoration. Of the 82,600 acres within the boundaries of the Forest Reserve, 29,930 acres are actually covered by some type of forest; the remainder being bare, unproductive lava and cinders. However, of these 29,930 forested acres, only 19,500 acres are used to any extent by the feral populations. This is partly because over 6,000 acres of the south slope of Mauna Kea are very densely wooded with the Naio tree, which



Puakeawe bushes are rounded off to mushroom shapes as sheep turn to less palatable fare, and eventually reduced to skeletons.

is unpalatable to sheep and hence of slight value in wildlife production, and partly the result of continued activities by man in the Pohakuloa Flat area during recent years which effectively frighten the sheep away. It is therefore the remaining 19,500 acres of Mamane forest which must bear the pressure of any population of herbivores allowed to inhabit the area.

Unfortunately, during this period the inadequacy of manpower, funds, and scientific understanding of the nature of the devastation being wrought resulted in a policy of continued neglect. Desultory efforts were made by the Hawaii forester to reduce the number of animals, but the effect was negligible. Activities during this early period of government control were also hampered by poor roads and primitive automotive transport. It was the era of the Model T; and most of Hawaii's roads were either axle-deep in powdery volcanic ash or quagmires of mud.

In 1935 a fence was constructed around the lower boundary of the Mauna Kea Forest Reserve using C.C.C. labor. Ironically enough, the motive for the project was to prevent the vast numbers of feral animals from descending from the forest into the adjacent pastures of the Parker Ranch Company, where they were competing heavily with domestic livestock for food. At the time the fence was built there were



an estimated 40,000 sheep within the Forest Reserve, as well as several thousand goats and an enormous number of wild pigs. The last cow had been removed in 1928, the last horse in 1935.

Today, after a century of degradation, the face

of the land is vastly changed. Persons familiar with the mountain in its present state will recognize the areas to which Douglas referred in his journal, but mainly through the geological descriptions. The "upper verge" of the woody country is no longer "highly picturesque and sublime" as Douglas found it, with small timber, strawberries, huckleberries, and grasses. As can be discerned in the accompanying photographs the "upper verge"—or in contemporary terms the Mamane treeline—now presents a stark, nightmarish scene of devastation and ruin. Where once Douglas "sate down to rest" among carpets of strawberries one has no choice now but to scuffle about in a waste of rocks, dusty subsoil, and the writhing limbs of dead trees which were unable to withstand the abuse of untold thousands of feral animals.

Conditions are uniformly distressing over practically all of the forested areas: 90 per cent of the topsoil is gone; over 40 per cent of the trees of the Mamane forest are dead, an additional 20 per cent dying. Natural reproduction of Mamane through seedlings or basal sprouts has been so long suppressed by overbrowsing that over most of the mountain there is no young stock whatsoever, either for browse or as replacements for the dead and dying mature trees. Grass production in all but the most favorable areas is limited to a small circle beneath individual trees. It is impossible to state with certainty, but it is esti-

mated that the present carrying capacity of the land is less than 5 per cent of what it was when domestic animals first entered the area.

The Mamane forest itself, lying principally between the elevations of 6,500 and 9,500 feet in a mountain-encircling band, still contains vestiges of the pre-herbivore state sufficient to allow some deductions about its ecology. The Mamane trees, which reach a mature height of 25 to 30 feet, form a medium for condensing moisture contained in the damp fogs which regularly blow up from the warm, humid lower elevations. Condensing on the leaves of the Mamane trees, the moisture drips through the foliage onto the ground below. It is this "fog-drip" which supplies the bulk of the water requirements both for the Mamane trees and the understory grasses and shrubs, as rains are infrequent and often occur as deluges over short periods of time.

The evidence also indicates that the trees themselves are dependent for life upon the microenvironment which they produce around their roots as a result of this condensate water source. The sequence of plant destruction which has ultimately upset this microenvironment occurred as a stepwise process, being the result of a peculiar trait in the feeding habits of wild herbivores. The insistence of these species upon feeding on the one or two most palatable plant forms in the habitat (in wildlife management



Beating a retreat across a rockpile they made of once grassy hillside, these feral sheep were a moment earlier seeking out any leaves that might have still reached below the Mamane browse line which is at the height sheep can reach standing on their hind legs. This is at 7,800 feet elevation.



With holding soil gone, thousands of Mamane trees topple over in death.

referred to as "ice cream" plants) to the exclusion of the less tasty or nutritious forms, places a heavier browse-pressure on some species than on others. If the population is large enough it may at length consume all the available vegetation produced by the ice cream species, at which time hunger forces the animals to shift to the less palatable forms and repeat the process of selective denudation.

And because the Mamane has the rather dubious distinction of being the most palatable plant species still extant on the mountain, there is not and cannot be any natural reproduction or regrowth of this basic element of the native forest. Consequently when an old specimen finally succumbs—made sickly and weak by the combination of unrelenting browse pressure, exposure of the root system through erosion to drying, and freezing temperatures—there are no replacements to spring up and fill the gap. Year by year the tree line creeps downward from the point where Douglas sat among the strawberries, leaving behind the bones of a once lush and beautiful woodland.

Destruction of the forest will inevitably result in the loss of its associated endemic bird life; for unlike

the highly adaptable human species which seems to be able to persist practically anywhere, birds are extremely specific in their environmental needs. The tremendous changes resulting from an extinction of the Mamane forest would far exceed the adaptive capacities of most or all of the native bird species.

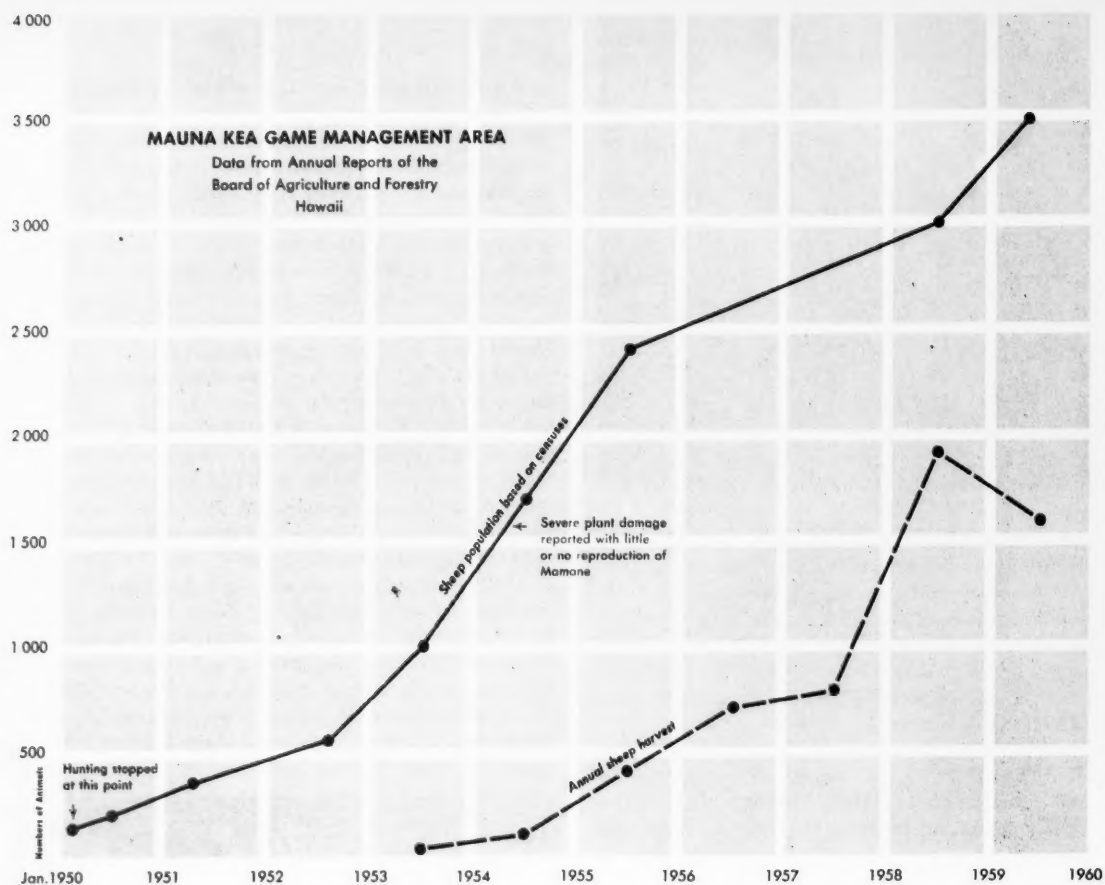
The endeavor to control numbers of sheep on Mauna Kea, for the purpose of protecting the forest from destruction, has been inadequate and ineffective for various reasons. In the early years of the Forest Reserve, lack of manpower and of access roads precluded any effective hunting of the sheep population. But in the 1940's sport hunting of the sheep by the public brought about a substantial reduction in numbers of animals. Perhaps likewise there was an epizootic disease in the herds; such has been suggested but data are lacking. In any event, the herds declined until in 1946 the estimated population was down to 5,000 and in 1950 down to 200.

At this point when prospects for restoration of the Mamane forest were brightest, there occurred an ironic reversal of the policy of sheep extermination. The Forest Reserve was turned over to the Division of Fish and Game and renamed the "Mauna Kea Forest Reserve and Game Management Area." The public had developed a taste for sheep hunting and



A remnant of the deep, rich soil that covered Mauna Kea to a height of 11,500 feet or more. The close-up graphically shows how the soil turns to dust, to be swept away by wind and rain, once sheep hooves and teeth have chopped up the turf.





Graph showing relationships between sheep population growth and harvest by hunting, and between sheep population increase and the condition of the Mamane forest.



Standing among a litter of dead Mamane trees, this carefully fenced pine planting has escaped the fate of the sheep-ravaged native forest just outside the barrier. Above Puu Laau, at 8,800 feet elevation.



Next to the Puu Laau Forestry cabin is an example of what can be achieved in rehabilitation. Kept free of sheep for many years by hunting pressure, this small section of forest at 7,400 feet is gradually recovering.

the Division elected to protect the sheep as a game animal—a policy which led to dramatic resurgence of the depleted herds. As a result of virtually complete protection from 1950 to 1953 and close regulation of shooting in more recent years, the remnant of 200 sheep in 1950 has grown to a herd of 3,500 in 1959. The accompanying graph shows the rate of increase in the population, based on careful censuses conducted annually by the Division; also shown is the increasing hunting kill, which reached 1,900 animals in 1958 and 1,600 in 1959. Despite a 40 per cent harvest, the sheep herds are increasing steadily today.

This raises a basic philosophical question as to the purposes of management of the Mauna Kea area. Before 1950 the orientation had been toward the forest and its preservation; feral animals were considered extraneous to the habitat and to be removed whenever possible. The new philosophy of management may accurately be defined as a policy of "hunter-

direction." It is well-typified by this excerpt from a 1955 Monthly Report of the Division of Fish and Game:

The hunters are very apprehensive about overshooting the population on Mauna Kea and creating a similar situation to 1949 which resulted in a five-year closed season. If such a long closed period again becomes necessary through overharvesting, the hunting public will be highly critical, and properly so.

It should perhaps be pointed out that the problem of hunting interests demanding the maintenance of dangerously high herbivore populations is not peculiar to Hawaii. Rather it is a universal problem, one with which many states are presently coping. The overabundance of deer in many parts of the United States, with the attendant problems of overbrowsing and habitat destruction, is in almost every respect identical to the situation on Mauna Kea and elsewhere in Hawaii where excessive herbivore populations are maintained to satisfy the immediate demands of the

hunting public. It was this philosophy of hunter-direction which in 1950, despite all the evidence of habitat destruction, prompted the Division of Fish and Game to recommend closing Mauna Kea to sheep hunting in order to "permit the population to rehabilitate itself."

By 1957 any gains which the flora had made during the brief ebbing of pressure in the early 1950's were erased. Coarse, shrubby Puakeawe again became the dominant part of the sheep diet; the brief spark of recovery had been effectively snuffed out. Except for a few roadside strips where hunting pressure forces away the encroaching animals and creates a somewhat illusory impression of recovering habitat, Mauna Kea continues to ulcerate and sicken. Consciously, deliberately, a forest is being destroyed; a rare and unique flora is being needlessly sacrificed.

The science of wildlife management has demonstrated that with proper study and application, most

habitats can support both a rich natural flora and an herbivore population. The concept of multiple land use is a valid one, but is successfully applied only when the biological necessities of an area are properly understood. Preservation of the Mamane forest is essential to the maintenance of sheep hunting as well as being a moral obligation in itself. If it is deemed in the public interest to maintain a huntable sheep population on Mauna Kea, the numbers should be limited to what the flora can support on a sustained yield basis.

Continued neglect of the present situation can have only one outcome: the ultimate and complete destruction of the habitat. When that occurs we all shall have lost—hunter and conservationist alike. The mountain will then no longer support either sheep or native plants or birds. Modern man will have produced, to his eternal shame and discredit, another biological desert.

The open grasslands of commercial sheep and livestock range on Mauna Kea's east slope at 6,000 feet dominate this scene; in the distance, the dark green scattering of Mamane woodland. The uncontrollable loss of native forest from these adjacent private lands underscores the vital need for safeguarding the flora contained in the forest reserve. Rising beneath the clouds are the cindercone-dotted upper slopes of Hawaii's great mountain.



TO KEEP

ARTHUR C. SMITH

THIS FOREST

PHOTOS BY VERA R. JOHNSTON

PRIMEVAL

ONE OF THE LAST STANDS of virgin Douglas fir, with its entire drainage basin as yet inviolate and available for preservation, lies in the rugged mountains of California's north coast.

In the year 1907 Heath Angelo traveled by logging train and horse-drawn stage to a resort in the then extensive north Coast Range forest of Mendocino County. He fell in love with the area while on his vacation and returned at every opportunity during the next few years, vowing to return some day and stay. The time came in 1931 when he and Mrs. Angelo acquired some property along the South Fork of the Eel River north of Branscomb. Over the years they have added to the original area so that the ranch now comprises approximately 3,000 acres.

From the outset the Angelos maintained their ranch as a nature preserve. As the years went by they saw more and more of the other forested areas in the northern part of the state logged over with the resultant ugly desolation. They determined to do everything in their power to preserve for posterity their remnant of the primeval forest.

Fortunately for our grandchildren and great-grandchildren there is a group of far-sighted persons striving mightily to preserve, intact, a few representative samples of our varied American heritage of wild nature before it is too late. The Nature Conservancy is dedicated to preserving permanently as living museums suitable remnants of forest, prairie, grassland, swamp, marsh, desert, and seashore which have so far luckily escaped the plow of the farmer, the ax

of the lumberman, or the bulldozer of the engineer.

Thus the dream of the Angelos coincided with the avowed aim of the Nature Conservancy. This happy circumstance has led to a project to establish the Northern California Coast Range Preserve.

The heart of the Preserve will be the Elder Creek drainage basin. Here majestic Douglas firs tower 200 feet in the air. At the time Linnaeus published the famed 10th edition of his *Systema Naturae* most of these trees were seedlings a few feet high and a few of the most venerable giants may already have been 100 years old.

In addition to the dominant Douglas fir forest there are redwood groves and mixed redwood-Douglas fir associations along the Eel River. The numerous broadleaf evergreens include coast live oak, canyon live oak, tanoak, giant chinquapin, California laurel (pepperwood to residents of Mendocino and the more northern California coastal counties), toyon, and madroño. Among the broadleaf deciduous trees are alder, California black oak, Oregon oak, Pacific dogwood, and bigleaf maple. No inventory has yet been made of the chaparral species and other shrubs or of the many ferns and wildflowers that abound in the deep forest, meadows, and on the steep slopes, but the flora is obviously rich and varied.

Wildlife, too, is abundant with numerous birds in all habitats, including ducks on the Eel River. Among mammals known to be here are mink, deer, bear, river otter, fox, raccoon, bobcat, and Douglas squirrel, with mountain lions probable. Salmon, steelhead, and





Panorama of the Elder Creek watershed looking eastward from the road on Elkhorn Ridge. Elder Creek rises below distant Signal Peak and flows westward towards the viewer down the canyon about midway of the right-hand page, going off to the right just above the patch of meadow at the extreme edge of the view. At the lower end of the same meadow (off the page) stands the spacious and picturesque Angelo ranch house with its adjoining buildings. Just beyond, to the right, Elder Creek runs into the South Fork of the Eel River which flows seaward through the foreground conifers, around the far side of Lower Walker Meadow in the center view, and off to the left. Just left of center, Black Oak Mountain commands the near horizon.

trout are found in the streams. Little is yet known of the reptiles and amphibians or the insect fauna of the area but they will undoubtedly be interesting. Already reported seen on the ranch is a butterfly normally found in Oregon.

The upper slopes of the Elder Creek drainage basin are partially covered with Douglas fir but also include extensive chaparral areas. These slopes are federal lands under control of the Bureau of Land Management. It is planned that these slopes, comprising about 3,300 acres, will be leased on a long-term basis and eventually acquired in order to safeguard the virgin forest below. If these lands should pass into unsympathetic hands and the timber removed the resultant damage to the main forest could be tragic. This has been all too clearly demonstrated in Bull Creek Basin.



These lands range from 1,350 feet in elevation to over 4,200 feet at Cahto Peak. In addition to the total length of Elder Creek and a portion of the South Fork of the Eel River, the Preserve includes parts of Tenmile and Skunk creeks, all of Barnwell and McKinley.

Moderate to heavy rainfall is characteristic of the late fall, winter, and early spring. Total annual precipitation averages about 82 inches; mostly as rain with a few short-lived snowfalls. A long, dry and warm summer season with some coastal fog is typical of the area.

Preserves of the Nature Conservancy are established primarily as living museums to insure that our rich heritage of varied natural habitats with their accompanying fauna and flora will not be lost for all

time. Obviously, picnicking, camping, and visiting by large numbers of people would not be compatible with these aims. This is true of the Northern California Coast Range Preserve and at the present time casual visitors are not permitted. However, those with serious interests in ecology, conservation, and natural history may request a permit from the Nature Conservancy office in Berkeley to visit this Mendocino County wilderness area.

According to the Nature Conservancy, "the entire Elder Creek watershed will be kept free of all developments except foot trails and a few simple shelters at the periphery. The remainder of the property may be utilized for other conservation purposes, provided they are in harmony with the intent of the
(Continued on page 20)

Clear, singing Elder Creek enjoys an inviolate watershed, unlike Bull Creek (BELOW) to the north in Humboldt County. When Bull Creek went mad in the winter of 1955-56 because its logged-off feeder slopes couldn't hold the excessively heavy rains, 420 of the world's tallest trees fell in the Rockefeller Forest in Humboldt Redwoods State Park.

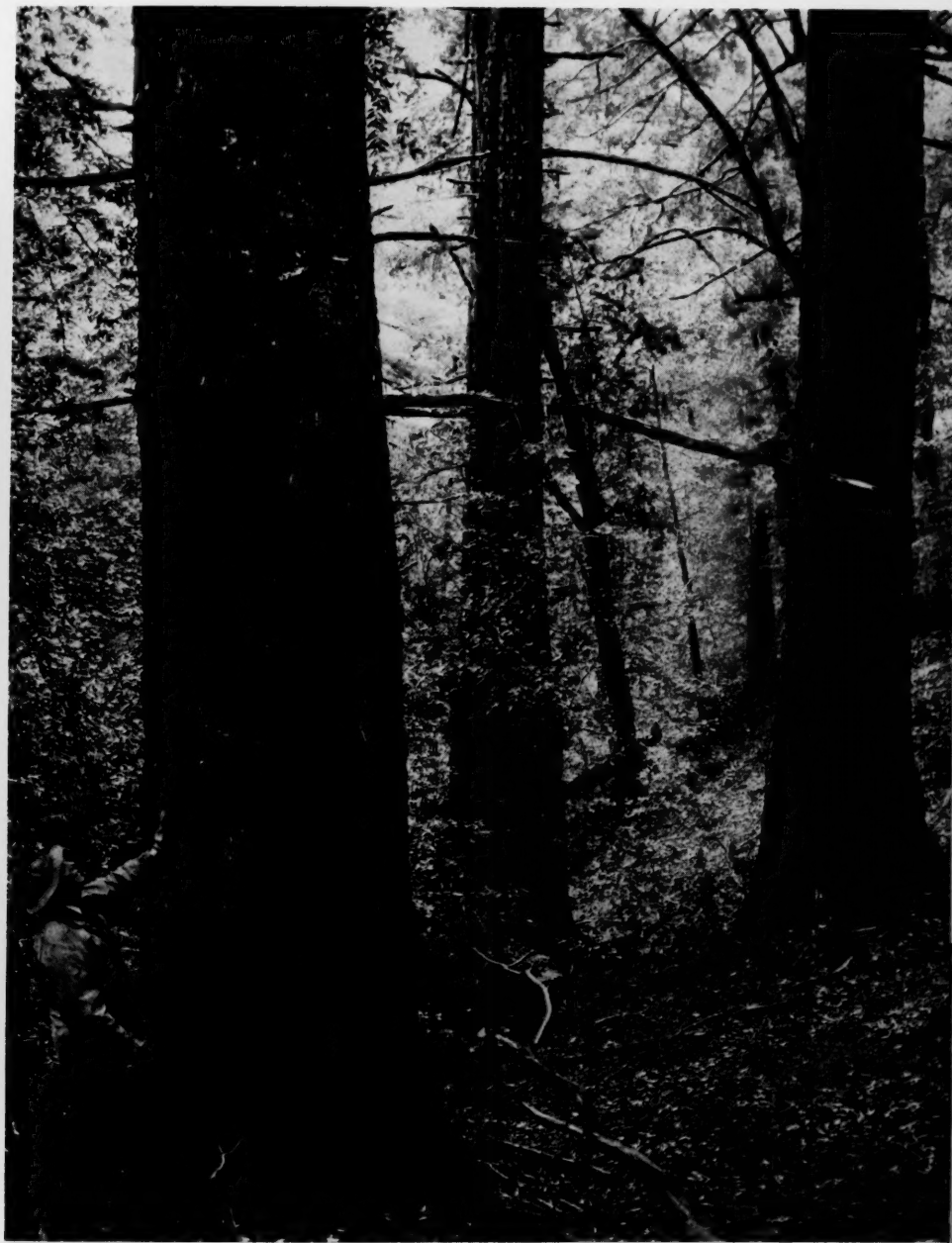
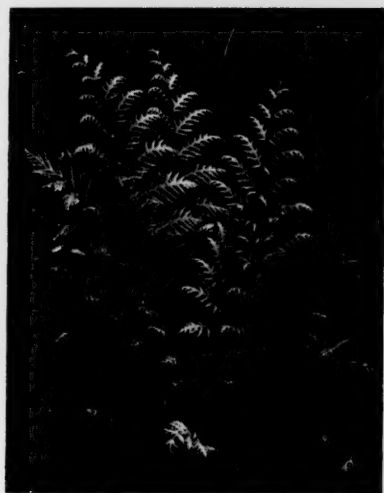
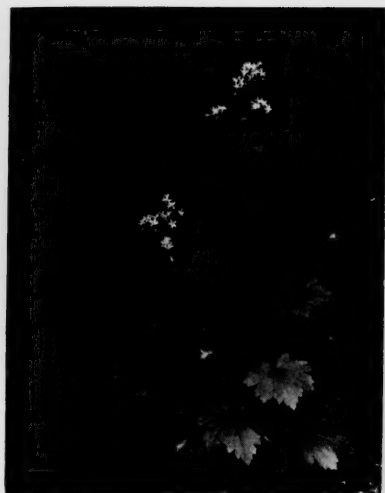


"Bull Creek Basin is a watershed lying a little inland from the coast in Humboldt County, California. Some 28,000 acres in area, it rises from 130 feet to 3,400 at its highest ridge. Its canyons are deep-cleft, its slopes steep. Its thin soils . . . are weak and susceptible to erosion [but are] capable of supporting myriad varieties of plant life, and did until 1947. Before then, Bull Creek Basin was described as having 'unbelievable beauty.' Its canyons were shadowy with redwoods, its slopes plumed with Douglas firs. Maples



High on the gutted slopes may be seen the cause and the beginning of Bull Creek's rampage—the worst kind of irresponsible logging.

Elder Creek can be saved from the tragic fate of Bull Creek



and alder, dogwoods and willows graced the streambanks. And the streams! Clear and unspoiled, they tumbled from the canyons, down the hills to spread into placid waters that wandered over the flatlands [where stood] an extraordinary grove of *Sequoia sempervirens* . . . perhaps the very finest of all [redwood] stands. . . . The rest of Bull Creek Basin stayed in private hands, and there was little, if any, public notice taken when logging was initiated on a large scale in 1947, . . . logging at its most

irresponsible. It stripped the steep slopes, gutted the canyons, gouged the hills with skid trails and roads. The soil, denuded of its protective trees, . . . reverted to its basic instability, and became easy prey to the heavy downpours the rainy season brings to this region. The sparkling waters of Bull Creek Basin grew dull and muddy; the streams burst their banks and spread even wider. . . ."


SIERRA CLUB BULLETIN, January 1960

▲ To save a watershed is to keep not only its trees but also its fragile understory of forest shrubs and its ground cover of saxifrage and Woodwardia ferns, and all the intricate network of living things it has built through quiet centuries.

(Continued from page 17)

project. Roads and visitor facilities will be kept to a minimum, and carefully aimed toward fullest use of the educational and scientific potential of the Preserve. Ecological research projects will be undertaken through cooperation with universities and colleges in northern California. At the outset, a base map will be prepared, the natural plant communities defined, the animal populations assessed, and weather and streamflow records begun. Future studies in environmental relations should build a fuller understanding of the natural forces that create and maintain this type of land. In the long run such knowledge will be indispensable in regaining the productivity of much cut-over and burned-over land in the north coastal region. Observations made patiently over periods of fifty years or more may reveal unsuspected facts, possible to obtain only where research will not be interrupted. Furthermore, use of the Preserve as a conservation center for teachers and young people

can disseminate the spirit of conservation in a way that makes a lasting impression."

Virgin stands of coniferous forest, cascading streams of crystal-clear water, spectacular chaparral covered ridges and slopes, peaceful meadows along the flood plain of the Eel, native plants and animals undisturbed by exotic introductions or by man—these are the things that will be saved from otherwise inevitable destruction by the saw and the bulldozer if the Northern California Coast Range Preserve can be successfully established. At this writing the first \$25,000 of a needed \$125,000 has been raised. The Nature Conservancy is now actively seeking funds to cover the balance. A contribution of \$33 will save for posterity one acre of this indescribably beautiful wonderland of nature. *Pacific Discovery* readers wishing to obtain more information about this project may write to Mr. William Drake, Western Regional Director, Nature Conservancy, 1711 Grove Street, Berkeley 9, California. 





Lower Walker Meadow, with Black Oak Mountain beyond.
Manzanita in right foreground, oak and Douglas fir.

Elder Creek in December rain.



RESTORING THE HOUSE OF THE 'SCOTCH PAISANO'

AMONG CALIFORNIA'S priceless historical heritages are its adobe-walled structures of Spanish-Mexican days. Of these old buildings the best known examples are the missions built between 1769 and 1833 by Indian workmen under the watchful eyes of Franciscan padres. These missions remain, of course, the most important and picturesque of early Californian structures and yearly attract hundreds of artists, photographers, and tourists in search of authentic relics of the state's colorful past. The majority have been reconstructed, though not always in exactly their original form.

That there was another series of adobe structures, less elaborate perhaps, but equally interesting, is sometimes forgotten. These were the homes of the people—their town and ranch houses. Scores of these early residences have already been lost quite naturally through the vicissitudes of time; others unfortunately, through neglect, vandalism, and deliberate razing. Many have disappeared entirely; others have been altered so as to have lost their original character and

charm. A pitiful few remain as mementos of a long-vanished era in California's history.

At least one more of these unique landmarks, the Reid Adobe on the grounds of the Los Angeles State and County Arboretum in Arcadia, once part of the vast Rancho Santa Anita, is being saved and restored for future generations of Californians to view and appreciate. This house was erected more than a century ago by Hugh Reid, a Scot who settled in California in 1835 when the province was still part of Mexico. Reid, (dubbed the "Scotch Paisano" by his biographer Susanna Bryant Dakin), swore allegiance to Mexico and adopted the Catholic faith. In 1837 he married a mission-trained Indian woman, Victoria, and acquired a family by adopting her children of a previous marriage. In time he became known as Don Perfecto Hugo Reid, a *ranchero*, prominent citizen, and in 1849 one of the signers of California's first state constitution.

In 1839 Don Perfecto applied for ownership of "three square leagues" of Rancho Santa Anita, a land-

SCIENCE LOOKS INTO IT

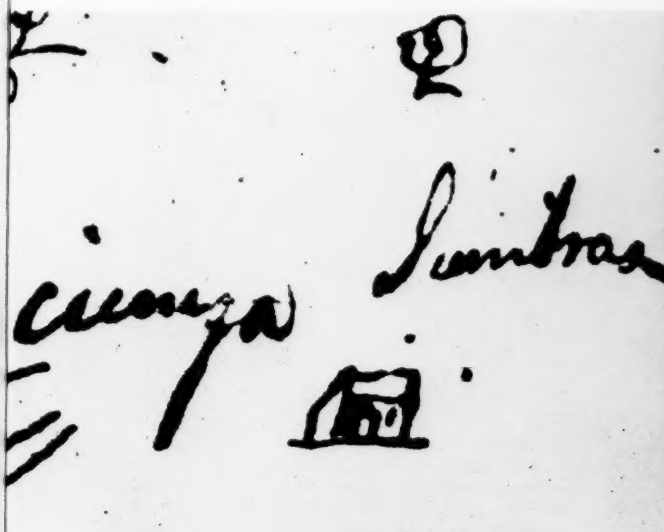
holding which had been part of the San Gabriel Mission establishment. His petition was passed upon favorably by various committees, and finally, in April 1841, Governor Juan B. Alvarado granted him provisional title to the land. His temporary grant was renewed two years later by Governor Manuel Michelmorena who advised Don Perfecto to try again when the government was "more definitely established." But it was not until March 1845, during Governor Pio Pico's regime, that he was granted clear title to Santa Anita, one which was to withstand the scrutiny of the United States Land Commission's investigations beginning in 1852.

Don Perfecto did not wait for final legal ownership before taking over Santa Anita but proceeded to develop it early in 1839. He brought in cattle, cleared land, and sowed wheat. As the site for his ranch house, he selected a low rise of ground near a shallow, spring-fed pond. Presumably he was his own architect, and although a relative newcomer and a foreigner, Reid followed the building plan used by all Californios. With the aid of Indian laborers from San Gabriel, he erected in 1840 a simple adobe house. Wood was little needed except for door lintels and roofing timbers. Walls were plastered inside and out with mud and then presumably white-washed. Overhanging eaves protected outside walls from heavy rains. As was customary, the house was built facing



Archeologists first tried to locate the Adobe's original foundations by digging a 5-foot wide trench along the north outside wall. A shorter 5-foot trench was then troweled at right angles to this to determine the nature of the soil and the original ground level of Reid's structure.

E. S. TAYLOR



The only—useless—documentary evidence: Reid's "Diseño de Santa Anita" of 17 March 1845, submitted by Henry Dalton in the Rancho Santa Anita Land Claims Case beginning in 1852. (Greatly enlarged section of photostat in the Huntington Library)



Under the razed wood-frame addition and debris, workers found the vestige of a 5-room adobe structure, poorly made. The area had been much disturbed by more recent plumbing, brickwork, and trenching. Note the entrance to the Reid Adobe, narrowed by recent wooden framing.



east to take advantage of the warmth of the morning sun.

Don Perfecto developed Santa Anita primarily as a wheat and cattle *rancho*. But things did not go well for the Scotch Paisano so after holding it for only eight years he sold Santa Anita to Henry Dalton, an Englishman who had settled in California. In the years that followed the property was sold and resold, passing through many hands. The adobe house was altered, enlarged, and modernized by its various occupants. The last owner to actually live in it was Elias J. ("Lucky") Baldwin, who had amassed a fortune through speculation in the Comstock silver mines. Following Baldwin's death there in 1909, the house stood empty.

In 1947, just one hundred years after Reid had sold the 13,319 acres of Santa Anita to Dalton for \$2,700, the State of California's Division of Beaches and Parks together with Los Angeles County purchased 111 acres of this once great landholding, including the homesite, for \$320,000 in order to establish the Los Angeles State and County Arboretum. Some additional acreage was acquired later. Through the combined efforts of the California State Division of Beaches and Parks, Division of Architecture, the Arboretum, and a Historical Committee made up of interested citizens, a program was developed for restoring the adobe house to its original appearance.

Archeologist George Kritzman carefully brushes the adobe blocks plugging the hitherto unknown entrance in the middle of the east wall; its sides had been finished with rounded, whitewashed adobe.

Funds were allocated for this purpose by the California Division of Beaches and Parks.

It was decided that in order to accomplish the restoration properly, a careful study should be made of the history of the house as well as of the remaining structure and its surroundings. Archeologists from the University of Southern California and the Archaeological Research Associates organization excavated in and around the walls of the building for nearly a year and a half. Under the accumulated dust and debris of over a century they brought to light deeply buried adobe-brick foundations and other evidences of the original building. A walled-up doorway, completely hidden under many layers of plaster, was discovered. It was determined that Hugo Reid's ranch house was a modest, oblong structure which had but three rooms.

Inside the Reid Adobe, Dr. William J. Wallace of the University of Southern California Anthropology Department measures the large, well-made adobe blocks of the old house's original foundations.

Flooring in two rooms was of hard-packed earth; the third was covered with neatly laid adobe blocks. Bits of *brea* or asphalt indicated that the roof was made of this local material smeared over a framework of light poles and covered with coarse grass and tules. Probably the original roof was flat or only slightly pitched as was typical at this time. The archeologists noted numerous repairs and remodelings. One tenant added a five-room adobe wing, which made the dwelling L-shaped. This addition was not sturdily built and did not last long. "Lucky" Baldwin had it torn down, and replaced it with an American-style wooden wing. He also changed the roof, and added porches and trimmings in keeping with the tastes of the 1880's.

Innumerable articles, lost or discarded by the inhabitants, were recovered during the archeological work. Hundreds of rust-eaten nails—many of the old hand-forged type—lead pistol balls, knives, forks, spoons, pieces of porcelain, bits of glass, and even needles were unearthed. Most surprising were the thousands of cut and sawed animal bones, remains of long-since digested meals, found scattered throughout the deposit. When thoroughly studied, all of these items will help to throw light upon the tastes, habits, and domestic life of the house's successive occupants.

Searching manuscripts and published historical accounts for information on the original appearance of Don Perfecto's house was less rewarding than the

digging, though some interesting and significant information was obtained. No detailed description of the structure was found. The only contemporary illustration is a tiny sketch drawn in 1845 by Hugo Reid himself on a map of Santa Anita Rancho prepared to accompany his final petition for ownership. Unfortunately this is too small and too schematic to provide information about the adobe's appearance.

Restoration of the Reid Adobe is now underway. The California State Division of Architecture is doing the work, utilizing the archeological and historical findings. Where exact knowledge is lacking or incomplete, information gathered about other adobes of the same era will be used as a guide. When completely reconstructed, Don Perfecto's house will stand as a typical ranch house of the 1840's. It will not be as elegant as the residences of metropolitan Monterey but it will not be devoid of a simple charm. Unlike many other historical landmarks, it is not hemmed in by modern buildings, so that something of its original surroundings can be recreated. No plantings or other features will be introduced that were not present in Hugo Reid's day. Furnishings of his period will be placed in the rooms. When all the work is completed, it will be possible for the visitor to the Reid adobe to imagine himself as a guest of Don Perfecto—entering into his home and into his times.

The Hugo Reid Adobe, divested of its many layers of patching plaster and concrete, begins to look more like the sturdy California ranch house it may have been in Reid's day. Note the simple lines, with flat roof, and the blocked entrance in the east wall. Behind it is the one-time *ciénega*, now deepened and dammed to form a tiny lake.



FOCUS ON NATURE WITH ARTHUR C. SMITH

THERE IS SOMETHING awe-inspiring about a virgin forest. To stand beneath towering trees, centuries old, which have perhaps been silent witness to untold events in human history, but are as yet unharmed by man and his civilization—such an experience can only bring a feeling of great humility closely akin to certain religious experiences. Small wonder that trees have been objects of veneration and worship in many primitive societies. (For a fascinating story of the status of trees through the ages see *The Triumph of the Tree* by John Stewart Collis.*)

On several occasions I have been thoroughly charmed by a forest. More than 20 years ago I led groups on overnight hikes into the Butano forest in the Santa Cruz Mountains. I have not been back since but my memory of the faint trail through the giant redwoods remains vividly clear. I fervently hope that current efforts to save this area are successful and that one day I can take my son hiking along that same trail.

Shortly after World War II, I concluded a New England hiking trip with a visit to the Mt. Katahdin area in Maine. For 18 miles before I reached the foot of the mountain I passed through the ugly desolation of a once-lovely forest recently gone to fill the voracious maw of the paper mill. Then I came upon a magnificent stand of Northern White Pine and Eastern Hemlock. Here I tarried for a week enchanted by the primeval forest. I wonder if it still stands or if it too has now gone into the paper mill?

Again recently I have come under the strong influence of another primeval forest—this one of Douglas Fir in California's Mendocino County. After visiting the forest last summer with my family I called it "a nature preserve of indescribably pristine beauty." (PD Sept.-Oct. 1959) Many requests for more information about this "intriguing place" followed.

As a result your nature columnist recently returned to the Angelo Ranch—this time accompanied by PD Editor Don Greame Kelley and bird man Richard H. Pough. Dick Pough is not only a noted ornithologist (author of the Audubon Bird Guides) and conservationist (formerly Chairman of the Conservation Department at the American Museum of Natural History) and presently secretary of the International Committee for Bird Preservation) but is also a very active member of the Board of Governors of the Nature Conservancy.

We headed north on a Saturday afternoon and that night enjoyed the wonderful hospitality of Howard and Olive Twining (Howard, formerly a fish and game biologist, is chairman of the local committee of the Nature Conservancy for the management of this project) at their sheep ranch near Ukiah. A roaring fire in the fireplace more than compensated for the steady rain outside and the conversation was lively. Don learned that our hosts had also visited Thane Riney in New Zealand (PD's special correspondent now in Southern Rhodesia); I learned that Howard had studied under Joseph Grinnell at Berkeley's Museum of Vertebrate Zoology shortly before I enrolled there; and we were all interested to hear Dick Pough talk of conservation efforts around the world.

At the Angelo Ranch next morning we found a huge redwood, loosened by the storm, blocking the primitive road. This meant a 1.5-mile hike through the dripping forest but we were prepared for the weather and found much of interest along the Eel River. The ghostly shapes of the deciduous oaks festooned with Spanish moss were highly attractive against the dark green of the conifers.

When the weather settled to a steady downpour we knew our desire to photograph the largest of the Douglas Firs along Elder Creek was not to be fulfilled that day. We again sat before a fireplace and this time listened to the story of the Angelo Ranch from Mr. and Mrs. Heath Angelo. This is the story your nature editor has told elsewhere in this issue. As we started back the streams were rising rapidly with water over the road in many places. Then the Academy carryall snapped a gear-shift rod, luckily in town so that we were soon on our way again.

The winter view of the forest, the first-hand story of the Northern California Coast Range Preserve, and the warmhearted hospitality of the Angelos and the Twinings, all made the trip entirely worthwhile. Each of us is looking forward hopefully to future trips with more adequate time for exploration of this wonderful wilderness area. When the Preserve is fully established you and I can rest assured that our grandchildren and great-grandchildren will be able to see a forest that is still "just as it was before the white man came."

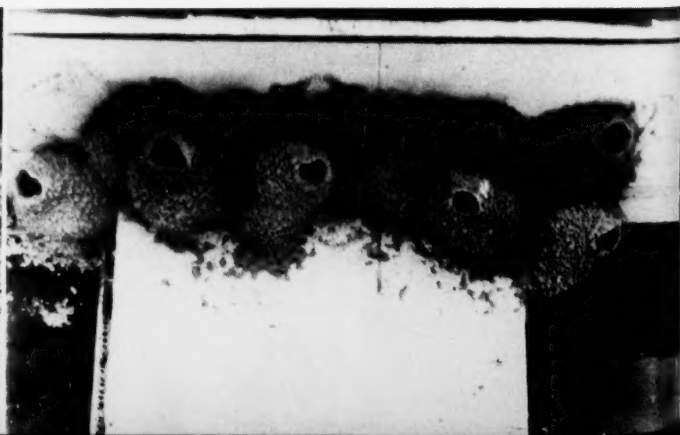
* See editorial, "Who Triumphs Tomorrow?" PD, Sept.-Oct. 1954, pp. 2-3.

WATCH FOR

ALTHOUGH tradition calls for these birds to return to Mission San Juan Capistrano on precisely the 19th of March, St. Joseph's Day, with some accounts reporting that the hour of return is also constant—don't you believe it. This "tradition" was manufactured by bored radio newscasters and newspapermen back in the early 1930's and has been kept alive by them ever since. Over the years ornithologically naïve readers and listeners have marveled at this "wonder of nature." Without the miracu-

lous and religious overtones, the true story is equally interesting. Furthermore, this annual bird migration event may be observed right near your own home.

Cliff Swallows winter from Brazil south to central Argentina and Chile. In summer they may be found from California to the Atlantic Coast. They return to the same nesting area each spring in barns, beneath bridges, and under the eaves of buildings. The colony at the famous mission represents only one of many thousands of such



What Do You Know About Nature?

RARE BIRDS



1

2

3

4

5

THE BIRDS pictured are either rare or making a comeback from near extinction. Study the photographs and the descriptions carefully, choose the name you think correct, then turn to page 30 to check your answers. Most important: do all you can to help protect our wild birds.

1. This bird was almost exterminated more than 50 years ago because of the great demand for feathers for women's hats. It survived, in large part due to the efforts of what is now the National Audubon Society, and today is commonly seen. It is: **A** White Stork. **B** Sandhill Crane. **C** Common Egret. **D** Great Blue Heron.

2. The largest flying creature in North America, this bird is very close to extinction. It is now found only in a limited area in southern California. Its name: **A** Turkey Vulture. **B** Golden Eagle. **C** Peregrine Falcon. **D** California Condor.

3. This bird is extremely close to extinction. Once present by the thousands from the Rockies to the Atlantic, fewer than 40 individual birds now survive. Their annual migrations north and south are duly recorded in the newspapers. The bird pictured is: **A** Sandhill Crane. **B** Whooping Crane. **C** White-faced Ibis. **D** Snowy Egret.

4. Long protected and apparently at least holding its own, this bird has shown an alarming decrease in numbers in recent years. It is: **A** Osprey. **B** Great Horned Owl. **C** Bald Eagle. **D** Audubon Caracara.

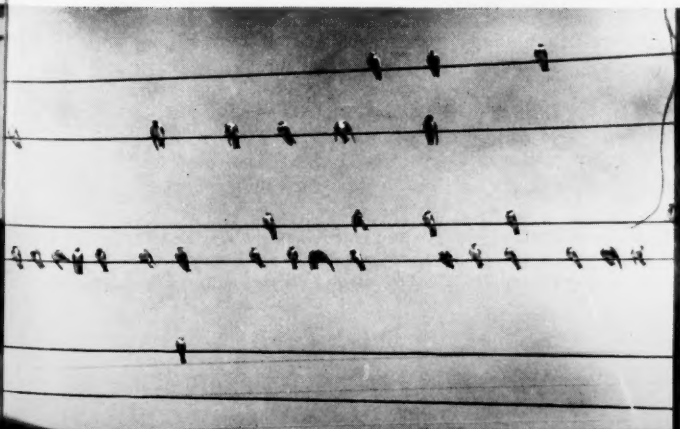
5. This native bird, long exterminated in much of its original range, is now making a comeback in some places and has also been introduced, apparently successfully, in parts of the West. It is: **A** Wild Turkey. **B** Spruce Grouse. **C** Attwater Prairie Chicken. **D** Sage Grouse.

(Allan D. Cruickshank photos)

Cliff Swallows (*Petrochelidon pyrrhonota*)

nesting sites in coastal southern California. The birds do return at approximately the same time of year, each year, as all migratory birds do. However, all the birds in the colony do not return on the same day and in California the days of return may vary from approximately the 3rd week of February to the 3rd week of March. Weather conditions undoubtedly greatly affect this time table and may throw it off at least a week either way. It is true that individual colonies are remarkably constant but none

could live up to the performance demanded by the press. Cynical (or sentimental) reporters have announced the return of the swallows exactly on time when there was not a swallow in sight and in other years after the birds had already been back in their nests for nearly a week. At any rate, watch for Cliff Swallows in your area—at their nests, at mudholes where they gather material to repair last year's home, perched on a wire, or in graceful flight.



Cliff Swallow. (Drawing by Terry M. Shortt, from *Audubon Western Bird Guide* by Richard H. Pough, courtesy Doubleday & Company, Inc., New York)

27

← (LEFT TO RIGHT) Cliff Swallows gathering mud for nest building (Gayle Pickwell); nests, characteristically jug-shaped, under a bridge; swallows "lined up" to rest (Cruickshank).

New View of Jupiter

SCIENCE is a progressive field of endeavor in which men are constantly searching for new truths and are trying to correct errors in their concepts of nature. Sometimes errors exist for a long time simply because no one realizes they exist. An interesting example is the order of the brightnesses of the brightest stars. Great care had been used in the measurement of the brightnesses of thousands of the fainter stars, but no one thought it necessary to check the brightnesses of the bright ones, such as Capella, Vega, and Arcturus. Finally, when someone got around to the problem in 1955, it was found that the order of brightness had to be changed in several cases.

The development of radio astronomy has prompted new attempts at the interpretation of the evidence of conditions on other worlds. We are making a new assessment of both old and new evidence. This is particularly true of the planets Venus and Jupiter. The concern in this article is for the latter.

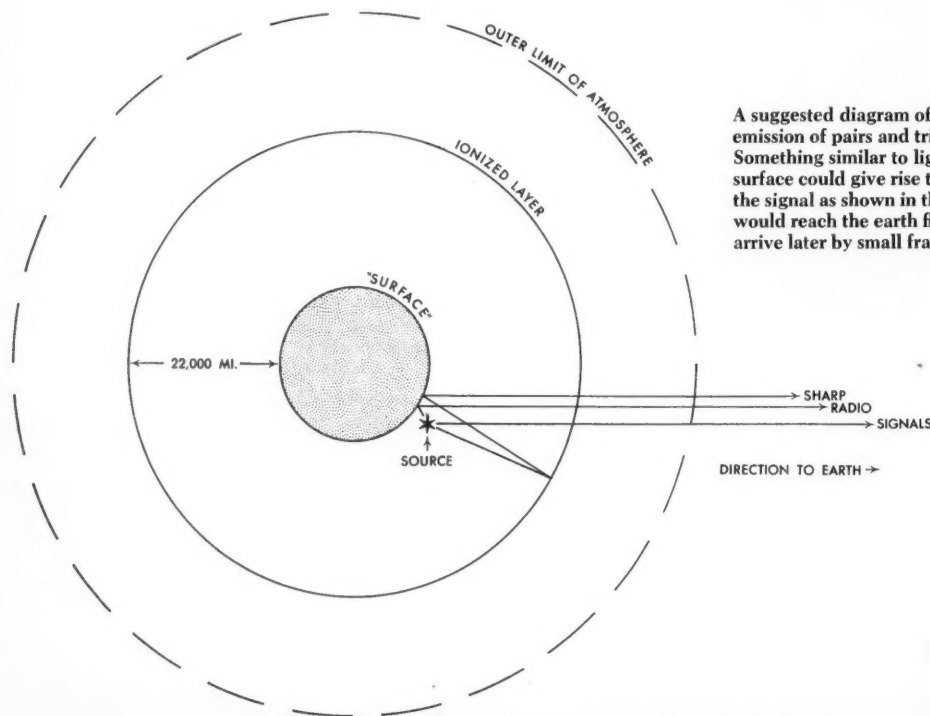
Evidence until very recently was limited to what could be learned from optical studies of Jupiter. It is a giant in dimensions. Its diameter is about eleven times that of the earth, its volume about 1,300 times, and its mass about 300 times. These data lead to a surprisingly low density—about 1.4 times the density of water. The density of the earth is about 5.5 times that of water, and on the basis of this high density, the core of the earth is assumed to be metallic.

Astronomers have designed models of the planet Jupiter on the basis of its size and density and have had to assume that if Jupiter has a solid core at all, it must be very small. The models have usually included a deep layer of ice a thousand miles or so in thickness in order to provide a solid core of a low density. The existence of ice was considered possible

on the basis of the temperature at the uppermost clouds in Jupiter's atmosphere, measured at -200°F .

Jupiter is five times as far from the sun as the earth is and hence receives $1/25$ the light and heat from the sun that the earth gets. The measured temperature of the upper atmosphere is in keeping with this distance from the sun. It is when one tries to estimate the temperature at the base of Jupiter's atmosphere that trouble arises. No one knows the nature of the interior of Jupiter. It may not have a solid core at all, but may consist of a peculiar solid-liquid state composed of chemical materials that are gases under conditions with which we are familiar and which we are apt to call *normal*. The atmosphere is known to contain ammonia, methane, and hydrogen. Under the tremendous pressure which must exist deep in the Jovian atmosphere, such gases may behave more like liquids than gases, and temperatures could be very high. The temperature of the earth's atmosphere at the level of the highest clouds is approximately -70°F . Yet the earth's surface temperature is as high as 100°F . or higher. It is now admitted that the ice layer very likely cannot exist, but that the surface is likely to be something indeterminate.

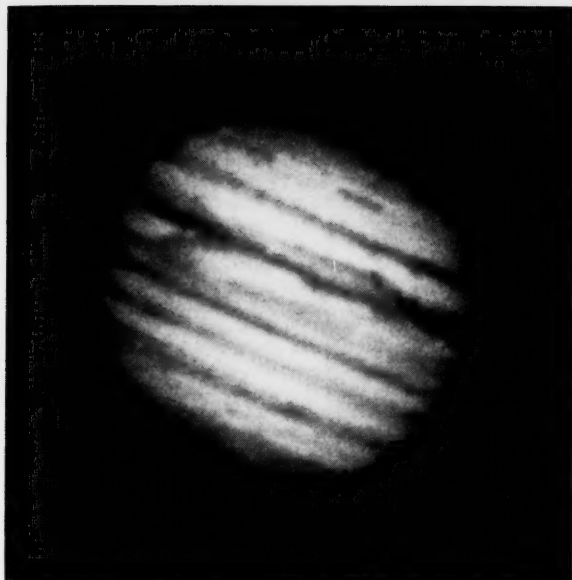
Radio emissions from Jupiter indicate that there must be some kind of a transition layer which can be thought of as the equivalent of a solid or liquid surface. Sharp bursts of radio static similar to those produced by lightning flashes in the earth's atmosphere are received from Jupiter. These staccato signals must arise from sources as much as a hundred thousand to a million times the power of terrestrial lightning strokes. This need not rule out the possibility of their originating in lightning-like discharges, for the higher density of the atmosphere of Jupiter may allow much



A suggested diagram of Jupiter which explains the emission of pairs and triplets of staccato radio signals. Something similar to lightning flashes occurring near the surface could give rise to these signals by reflection of the signal as shown in the drawing. The direct signal would reach the earth first; the reflected signals would arrive later by small fractions of a second.

PACIFIC DISCOVERY

▲ Jup
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are p



greater electrical stresses to build up before the discharge occurs.

These sharp signals usually occur in pairs or triplets separated by small fractions of a second. One interpretation which gives a good account of this behavior is that the radio signal produced by the outburst is reflected from the "surface" of the planet and also possibly from an ionized layer at an estimated height of about 22,000 miles above the "surface." The first signal comes directly from the source. The second may come from a reflection at the planetary surface, and the third, in the case of a triplet, may come from a double reflection—first from the ionized atmospheric layer, then from the surface. This is illustrated in the drawing. All these signals seem to originate in one or two locations on Jupiter. It is when Jupiter has those regions turned toward the earth that the signals are received. Here too is a clue to the amazing depth of the Jovian atmosphere.

Other radio measurements indicate that Jupiter has extensive "Van Allen radiation belts" surrounding it. These are doughnut-shaped zones in which charged particles are captured and stored by the magnetic field of the planet. The belts surrounding the earth were discovered by instruments in satellites. The consequent necessity for the existence of a magnetic field around Jupiter must shed some light on the nature of its interior.

At least we now have a new weapon with which to attack the mystery of the giant world. The radio telescope may give clues to the nature of this most alien planet—a world of unbelievably high atmospheric pressure where storms a million times more violent than earthly ones may churn the methane and ammonia winds in a constant, planet-wide tempest. Man has finally discovered a means of dipping below the enveloping clouds of the Jovian world, and has turned up evidence of thunderbolts a million times more violent than were dreamed of by those who thus armed the mythical god in ancient days.

G.W.B.

▲ Jupiter's wide cloud bands are easily distinguished in this photograph. They are aligned parallel to the equator, and result from the trade winds which are probably of extreme violence on the planet. (Lick Observatory)

ASTRONOMY

Conducted by George W. Bunton

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SKY DIARY

March, April, May, 1960

(Pacific Standard Time Except Where Noted)

Phases of the Moon

| | | |
|-----------------|---------|---------------------------|
| ☾ First Quarter | March 5 | 3:06 A.M. |
| ☾ Full Moon | 13 | 12:26 A.M. |
| ☾ Last Quarter | 19 | 10:41 P.M. |
| ☾ New Moon | 26 | 11:38 P.M. |
| ☾ First Quarter | April 3 | 11:05 P.M. |
| ☾ Full Moon | 11 | 12:28 P.M. |
| ☾ Last Quarter | 18 | 4:57 A.M. |
| ☾ New Moon | 25 | 1:45 P.M. |
| ☾ First Quarter | May 3 | 6:01 P.M. (Daylight time) |
| ☾ Full Moon | 11 | 10:43 P.M. " " |
| ☾ Last Quarter | 17 | 12:55 P.M. " " |
| ☾ New Moon | 25 | 5:27 A.M. " " |

(Daylight Time Begins Sunday, April 30)

Eclipses

A total eclipse of the moon occurs on March 12-13 and will be visible generally throughout North and South America. The moon enters the earth's shadow at 10:38 P.M. on March 12 and leaves the shadow at 2:18 A.M. on March 13. The moon is completely within the shadow from 11:41 P.M. March 12 to 1:16 A.M. of March 13.

A partial eclipse of the sun occurs on March 26 but will not be visible in the United States. It will be visible in Australia and Antarctica.

The Planets

Mercury: Is best seen as a morning star in early April when it reaches its maximum distance above the morning horizon. It is 28° west of the sun on April 7. The moon occults the planet Mercury at 4:00 A.M. on March 25 and again at 6:00 P.M. on April 23. The first is visible generally in America and the second visible in central Russia. In an occultation the moon passes between the earth and the celestial body being occulted. Only the emergence of Mercury will be seen on the Pacific Coast on the morning of March 25.

Venus: Is visible as a morning star through the month of March but gradually moves too close to the sun to be seen.

Earth: Spring begins at 6:43 A.M. on March 20.

Mars: Is rising two hours ahead of the sun in early March and three and a half hours ahead in late May. It is not a spectacular object during the spring. Its magnitude is +1.3 to +1.1. During the three months Mars moves through Capricornus in March, Aquarius in April, and Pisces in May.

Jupiter: Rises about five hours before the sun in early March, and rises about an hour and a half after sunset at the end of May. Jupiter begins at retrograde (westward) motion on April 20. It is brightening during the entire three months as the earth is overtaking it. In early March it is magnitude -1.6 and by the end of May it is -2.2.

Saturn: Rises about three hours before the sun in early March and rises about two and a half hours after sunset in late May. Like Jupiter, it increases in brightness from +0.8 in early March to +0.5 in late May. Saturn remains in Sagittarius.

Good investment: Wildlife Futures

Wildlife in America. By Peter Matthiessen. Introduction by Richard H. Pough. Drawings by Bob Hines. The Viking Press, New York. 1959. 304 pp., 8 color plates, 32 halftones, numerous line drawings, map. \$10.00.

A band of wild birds, about two dozen strong, carries on a pattern of life much older than the human race. Its comings and goings between nesting ground in northern Canada and wintering place on the Gulf Coast, its arrivals each year and its numbers are matters of international concern regularly reported in the press. Magnificent birds of great size, they are all that exist of a species. Unconsciously in what may be their final few years on earth, the last of the whooping cranes symbolize a rising concern for all forms of wild life in America. Never before so keenly, it matters to many people whether this or that species of bird or mammal, even of reptile or fish, shall stay with us.

The record of European man's discovery, investigation, exploitation, appreciation, and guardianship of the incredibly rich fauna he found teeming the land, waters, and air of this new continent has long needed the summarizing in one book which a devoted amateur of wildlife, Peter Matthiessen, has so ably given it in *Wildlife in America*. The bits and pieces of an extensive bibliography (PD is cited twice), sources given under "Reference Notes," personal studies and travels of the author, and sundry help credited to many "conservationists, biologists, and others" (including our Academy's own Drs. W. I. Follett and Alan Leviton) have been woven with skill and style into the substance of a book which lovers of the wild and the cause of conservation will read, and which every American in whom interest and concern are capable of being aroused *should* read. Bob Hines merits a special nod for the lively, accurate pen drawings which with plates and format make a handsomely inviting book.

There is a tendency for conservation-slanted books to deplore and view with alarm so resoundingly as to leave many readers benumbed with sheer hopelessness. With Mr. Matthiessen we all but feel the "awesome finality of extinction" as the last great auk dies by human hands in 1844; the photograph of "Martha," the last living passenger pigeon (d. 1914), gives a chilling sense of loneliness set against the accounts of sky-blackening billions but a few pigeon-generations earlier—yes, there is much to lament and deplore. But there is some mitigation of guilt-feelings in the knowledge that certain species were doubtless near the end of the long trail before we landed here—forms unable to adapt to change or even to survive some natural catastrophe. And there is a future: As Mr. Pough says in his Introduction, this book can "point the way to a better treatment of wildlife. . . . Nature can produce abundant wildlife populations if we give back to her the exclusive use of a few patches of land here and there, the land that once supported the fabulous wildlife of which the author gives us such a clear and impressively documented story." It is this very salvage and restoration that our many vigorous conservation societies exist for. If this book helps win friends and influence people for the Nature Conservancy, the National Audubon and Wilderness societies and the rest and for the support of wildlife research and protective laws, it will even more surely hasten the end of any hopelessness remaining to inhibit action.

Zulu Journal: Field Notes of a Naturalist in South Africa. By Raymond B. Cowles. University of California Press, Berkeley and Los Angeles. 1959. xiv + 267 pp., 67 photographs, map. \$6.00.

At the Sierra Club's last Biennial Wilderness Conference, staged in San Francisco with the coöperation of the Cali-

fornia Academy of Sciences, Dr. Raymond B. Cowles (professor of zoology, University of California at Los Angeles) was among those who spoke most vigorously for a worldwide program or research, education, and action aiming at the control of human population. Dr. Cowles had recently returned from a sojourn in his native South Africa. As a boy he had known there a land of lush valleys, healthy farms, plentiful game. He was saddened to find, a half century later, a country sick with the correlative diseases of overpopulation and land depletion, its wildlife fast disappearing before the human tide. *Zulu Journal* is a record of his boyhood adventures with animals which began his career as a naturalist, and of his observations, on his recent visit, of the total ecologic picture, of which mankind is of course a dominant part. It may be read for its vivid and instructive descriptions of strange animals and birds, large and small, its accounts of hunting and photographic journeys into big-game country, of game reserves, bird life and the seasons, of Zulu ways and superstitions. *Zulu Journal* is the book of a naturalist. It is also the book of a man deeply concerned for his fellow-men and the plight into which his native land has fallen. Dr. Cowles is exceedingly fearful for the future, not only in South Africa but the world over. In South Africa, he concludes, "one sees in merciless clarity what in the coming century may overtake the rest of Africa and the world. . . . Almost everywhere, all the lands that are really livable, all the fertile and healthy farm lands, are occupied. . . . The multitudes consume the crops and then, from dire necessity, destroy the land from which they get their sustenance. And yet we speak of man's conquest of nature as though it were an unmitigated blessing, and our statesmen and politicians with no recognition of population growth, carelessly speak in one breath of both eliminating disease and raising the standard of living of the world. Without victory over man's careless irresponsibility for his reproduction we can never achieve the millenium that has been so nearly within our grasp, but instead fumblingly and ignorantly, we may go down to defeat." As for wildlife, "almost everywhere on our globe, man's uncontrolled increase in numbers will eventually threaten all forms, although a few adaptable species may locally survive. . . . A gloomy mood," he says, "in which to end what was in all likelihood my last visit to the land of my youth. And yet, as I left the mission on my first stage of departure, a Cape ringdove and a collared barbet were singing in the coral tree shading the porch of my old home. As I started driving down the road toward the river en route to Durban and the airport, their fading calls were a reminder of the persistence and adaptability and vigor of all living things." Even our Malthusian demographer Dr. Cowles would remind us that while there is life there is always hope!

"To speak of many things"

Country Matters. An Anthology selected and edited by Barbara Webster. With Drawings by Edward Shenton. J. B. Lippincott Company, Philadelphia and New York. 1959. 307 pp. \$5.00.

Nature writing has become a favorite field for the anthologist. The anthology as a vehicle needs neither explanation nor apology; it needs anthologists of wide and informed reading, discrimination, and sensitivity to the probables in reader acceptance. The product should be a book, not a scrapbook. Barbara Webster (who is Mrs. Edward Shenton) qualifies fully. Sparing of herself, with no more than preface, biographical notes, and one brief passage from her book *The Color of the Country*, she has given form to an amazingly wide scatter in time and theme by the well-used device of groupings. Her authors—who include the Psalmist, a tenth century court lady of Japan, St. Francis,

and a host of the recent and living—speak of gardens, meadows and woods, animals and birds, lakes and rivers, hills, country living, and “Man in Search of His Place.” It is rewarding indeed to be reminded of superb nature passages in novels, like Thomas Hardy’s powerful description of Egdon Heath (*The Return of the Native*); Thomas Wolfe’s paean to October (*Of Time and the River*); or Alan Paton’s dirge for a ruined African landscape (*Cry, The Beloved Country*). Or to enter with Howard J. Shannon into a Middle Cretaceous forest (*The Book of the Seashore*). Or to reflect with Loren Eiseley on the secret of life (*The Immense Journey*), by way of closing. D.G.K.

“Curiouser and curiouser”

Curious Naturalists. By Niko Tinbergen. Basic Books Inc., New York. 1958. 280 pp., text figs., halftones. \$5.00.

The old-fashioned naturalist is not gone, he has become new-fashioned. By calling his study “ethology” or talking of “pattern perception” and “imprinting” he has regained respectability even in the halls of experimental ivy. What this means to the general reader is that serious biologists have learned anew that what goes on in the world of nature is fascinating indeed, and that this world of observation and discovery is open to all who approach nature with an alert, questioning mind. In this book Dr. Tinbergen tells how some of these studies began, and of some of his experiences in observing insects and birds. Almost everyone interested in nature has observed some of these curious things, like the ability of a ground wasp to find its burrow or the posturing of courting birds but it does not occur to many that simple experiments with these things can yield surprising information. This book tells the story of such investigations, and is intended to stimulate others to do likewise: “If my stories of curious naturalists do not send out some readers to go and observe for themselves, this book will have missed its point.” J.W.H.

To the moon on a pogo stick

The Moon Car. By Hermann Oberth. Translated from the German by Willy Ley. Harper & Brothers, New York. 1959. 98 pp., 23 line drawings and frontispiece. \$2.95.

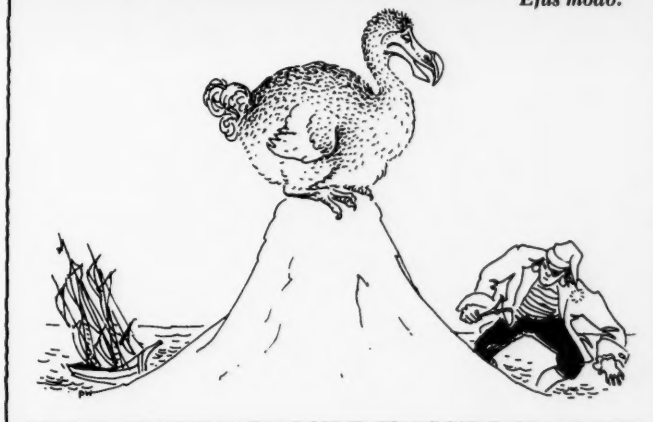
In this short treatise, written in the terse and colorless language of the technical report, is found evidence of the seriousness with which space scientists and engineers regard the imminence of manned space exploration. Hermann Oberth, often called the father of space travel, gives the steps and the arguments in the design of a vehicle for transporting an exploring party over the face of the moon. Every detail of the vehicle and its alternate equipment is carefully described. Even the mathematics of temperature, energy and pressure problems is included.

While this is not a book for light reading, some with a mechanical bent will find it interesting. The design of the Moon Car and its revolutionary means of locomotion will be surprising and perhaps just a mite shocking even to the most avid and knowing science fiction enthusiast. But this is not a thing of fiction. When one considers the topography and the conditions explorers will find on the moon, Oberth’s design appears quite reasonable.

The car would resemble a giant long stemmed goblet and is designed to go racing across the rough lunar surface at speeds up to seventy miles per hour on a ridiculously small foot fitted with tractor treads. The stem is designed to be collapsible in a telescoping fashion and controlled by the driver so that the car will hop pogo-stick fashion over small obstructions and will leap crevices and narrow chasms. The one legged monstrosity keeps itself

The Wright Approach to Natural History

*Exit Dodo,
Ejus modo.*



erect and stores the energy for its jumps through the use of a huge whirling gyroscopic fly-wheel situated just above the roof. G. W. B.

Birds, mostly

A Field Guide to the Birds: Giving Field Marks of all Species Found East of the Rockies. Text and Illustrations by Roger Tory Peterson. Second Revised and Enlarged Edition Sponsored by National Audubon Society. Houghton Mifflin Company, Boston. 1959. xxvi + 290 pp., profusely illustrated in full color and line. \$3.95.

A Field Guide to Bird Songs of Eastern and Central North America arranged to accompany, page by page, Roger Tory Peterson's A Field Guide to the Birds, 2nd revised edition. “Two 12-inch LP records of songs and calls of more than 300 species of land and water birds recorded in the field by the Laboratory of Ornithology, Cornell University, under the direction of Dr. Peter Paul Kellogg and Dr. Arthur A. Allen, in collaboration with Roger Tory Peterson.”

Even though this picture-book-with-sound-track set is the east of the Rockies one, mention of it here might hasten the arrival of our Western set—we trust a record is in the making to go with the book. A wonderful idea, the record useful in the field if you have a portable player to throw in the car, and naturally you will use it for your homework, too. There are four sides, of course. A box on the back of the slipcase says: “Matching Kodachrome slides for most of the species recorded here are available from the Laboratory of Ornithology, Cornell University, Ithaca, New York.” Teachers take note.

Bent's Life Histories of North American Birds: Volume I—Water Birds; Volume II—Land Birds. Edited and abridged by Henry Hill Collins, Jr. Harper & Brothers, New York. 1960. (I) xxvii + 356 pp., (II) ix + 374 pp. Each volume, \$5.95.

March 16 is the publication date for this digest of the great 20-volume work (published between 1919 and 1958) which will be welcomed by bird-lovers, students, and librarians whose budgets have not permitted the full treatment. These are not handbooks for identification, of course. There are no illustrations.

California Wildlife Map. Section A—Mammals; B—Plants; C—Birds; D—Reptiles & Amphibians; E—Animals Without Backbones. Prepared by Vinson and Kirby Brown. Naturegraph Co., San Martin, Calif. 1958. Sheets 36 x 23 in., printed in several colors. Each, \$2.25; set of 5, \$10.00. Cloth-mounted, varnished, rollers, each, \$6.75; set of 5, \$32.00.

Each section shows the state keyed by color and pattern into 14 habitats—marshes, chaparral, grassland, etc. The rest of the sheet is filled with line drawings of representative species. As a teaching-learning aid, this is a set well designed for classroom, camp, and home use. An instruction booklet is available.

Arachnidae and A. D.

EDITOR, *Pacific Discovery*:*Pacific Discovery* is always GOOD. I read it from cover to cover and some of it twice.

E. P. CHACE

San Diego, 1 February 1960.

EDITOR, *Pacific Discovery*:

It was with great pleasure that I read the January-February issue of *Pacific Discovery*, which was my introduction to this magazine. It is entirely different from the publication of the Minnesota Academy of Science and of much more interest to the layman.

On page 27 there is an answer to the question, "What is a vector?" In the last paragraph of this article it states that, "Vector control agencies find themselves concerned not only with disease-carrying mosquitoes and flies and other true vectors as well as closely related pest species, but also a great variety of other noxious or annoying animals such as yellow jackets, spiders, scorpions, and rattlesnakes."

If the vector control agencies would omit spiders from this list and refrain from killing them, they would have less of the true vectors to exterminate. For supporting data on this subject, refer to *The Life of the Spider* by Compton, or any of the books by Dr. Gertsch, Mr. Comstock, or B. J. Kaston.

Compliments on your interesting publication.

W. H. TUSLER

Chairman, Minnesota Chapter
The Nature Conservancy

Minneapolis, 10 February 1960.

Thanks to readers Chace and Tusler for their bouquets. In reply to Mr. Tusler: the intended inference concerning spiders is that people are sometimes annoyed by certain spiders, one way or another, and do call upon Vector

Control to do something about it. No reflection on either vector control people or spiders! And Mr. Tusler means no reflection on the MAC, of course. Ed.

ASTRONOMY EDITOR, *Pacific Discovery*:

Dr. Chauncey D. Leake introduced me last week to *Pacific Discovery* in which I discovered many matters of interest presented in a lighthearted, enjoyable fashion. I liked your neat disposal of the decennial controversy over the years that end in zero.

In it I noted something that I had not found in the encyclopedias—the introduction of the A.D. dating system by Dionysius Exiguus. I wonder if you could give me some references so I could find more. When, for instance, did it become customary to set down the A.D. dates in documents, to carve them on tombstones and cornerstones? Have all the dates on the histories—the good histories, of course—been reduced to the Gregorian Calendar or are some of them still several days off? Was there any system of dating things, letters for instance, before 533? I don't ask for a comprehensive answer, but any hints and suggestions would be appreciated. JOHN MERRILL WEED

Columbus, Ohio, 21 February 1960.

An interesting reference is a booklet entitled Star of Bethlehem, by Roy K. Marshall, published by Morehead Planetarium, University of North Carolina, Chapel Hill, N.C. This reference indicates the first use of A.D. in defining dates was in the year 605 A.D. However, Dr. Marshall states, "The practice was not common until the Council of Chelsea ordered it in the ninth century." The older method of defining dates involved the letters A.U.C., meaning "from the founding of Rome."

I cannot answer your question regarding the reduction of historical dates to the Gregorian calendar and I must refer you to an historian in this matter.

Thank you for your kind words about PD. G.W.B.

Bones for the Archaeologist. By I. W. Cornwall. The Macmillan Company, New York. 1956. 255 pp., frontis., 60 text figs., inset table. \$7.50.

There has been a long-standing need for a book or manual that would aid the archeologist in identifying vertebrate remains found in association with archeological sites. This book represents a sincere effort and a great deal of work on the part of the author to present the archeologist with a handy reference work; however, he has limited his identifications to the Old World vertebrates. For a work published in the U.S. as well as the U.K. and thus evidently intended for use by New World archeologists as well as Old, it offers no help in the identification of remains of extinct Pleistocene forms; only particular Old World species are present in some intercontinental families.

If, as it seems, the book is intended as a handbook for reference and instruction, it has some obvious omissions. It has no index, which in a book of this sort is a practical necessity; and it seems very bookish to be used for either of the above purposes. Basic practical information possibly could have been presented in a shorter, more concise form to enable even beginners to enjoy its more advantageous use.

Some of the illustrations are too small to be of any use in the identification of detail. Though the human skeleton is discussed at some length there have been omissions of pathologies and anomalies which have attracted wide attention in the field. There is no mention of the *Dryopithecus* pattern in primate-human identifications.

Owing to some of the objections mentioned above, some readers will prefer to return to older, more standard works. For at best this book must be augmented with material from other sources. With future revisions, and information added for the benefit of New World archeologists, this could be a most useful reference work. The author must be lauded in any event for attempting

to present a much needed reference in a field where there is a dearth of works of any kind. And in all fairness, it should be borne in mind that this is primarily a British book by a British author, despite the New York imprint.

MEARL F. CARSON

The Sea Off Southern California: A modern habitat of Petroleum.

By K. O. Emery. John Wiley & Sons, Inc. New York. 1960. 366 pp., 248 figures; folded map. \$12.50.

The part of the ocean considered is bounded by the coast of California from Pt. Concepcion to Descanso Point on the northeast, the 32nd parallel on the south and the 121st meridian on the west. At first thought this may not seem a natural region, but insofar as it includes the system of islands and basins off the coast, it is a natural physiographic unit, and the basins involved have various individual peculiarities which set them off from the Pacific Ocean. Whether it is a habitat of petroleum, as the subtitle declares, is a moot point. By the same token the Hawaiian Islands are a habitat of lava. There is a wealth of information in this book, which is much larger, because of its page size, than the number of pages suggests, about bottom topography, waves, tides, marine life, sediments and economic aspects of the region and all the other things included in modern oceanography. Several thousand separate papers have been consulted in preparing this book, and most of them will be found in the bibliography. The author is to be congratulated on achieving his purpose of summarizing this material, and the book will be indispensable for the libraries of petroleum geologists, aqualung aficionados and serious students.

J.W.H.

FOCUS ON NATURE: Answers to quiz on page 27—

Allow twenty points for each correctly answered question. 1. C Common Egret. 2. D California Condor. 3. B Whooping Crane. 4. C Bald Eagle (immature). 5. A Wild Turkey.

academically speaking

IN OCTOBER 1959 DR. EDWARD S. ROSS, Curator of the Academy's Department of Entomology, once again packed bags, collecting equipment, and cameras and was off to faraway places. Destination: the island of Madagascar. Purpose: further background for his global monograph of insects of the order Embioptera, or web-spinners.

Though Madagascar was to be the geographical omega, his planned itinerary was a tortuous one. After a brief stop-over in Washington, D.C. for conferences with the staff of the *National Geographic Magazine* apropos his forthcoming article on African insect hunting, Dr. Ross enplaned from New York City for London and the British Museum.

Fruitful weeks ensued: days filled with describing and illustrating types of embiids not borrowable from the Museum, as well as conferring with members of the Museum staff; nights with examining London and the Londoners who then were undergoing the rigors of a national election, Trafalgar Square and Piccadilly ringing with a particular vociferosity.

From London to Paris and the Muséum National d'Histoire Naturelle, thence to Genoa and the Museo Civico di Storia Naturale Giacomo Doria, each stop devoted to further description and drawing of type specimens of the little-known order, Embioptera. On to Sardinia and the Istituto di Zoologia, Università di Cagliari, and then by ship to Rome where Dr. Ross was joined by his associate, Mr. H. Vannoy Davis.

By way of Khartoum and Nairobi, the two intrepid naturalists flew to the terminus of their trip, Tananarive, Madagascar, where they were received by Dr. Renaud Paulian of the Institut de Recherches Scientifiques à Madagascar.

Using Tananarive as a base of operations, they visited the major vegetation zones of the island: the great forest area of the eastern slope—photographing, collecting, often surrounded by groups of almost insanely curious lemurs; the northern end of the island and Nossi-Bé, site of an important oceanographic station, and the nearby lowland forest reserve—where they were diverted, understandably, by the wonders of the coral reef; finally, the remnant high mountain forests near Tananarive.

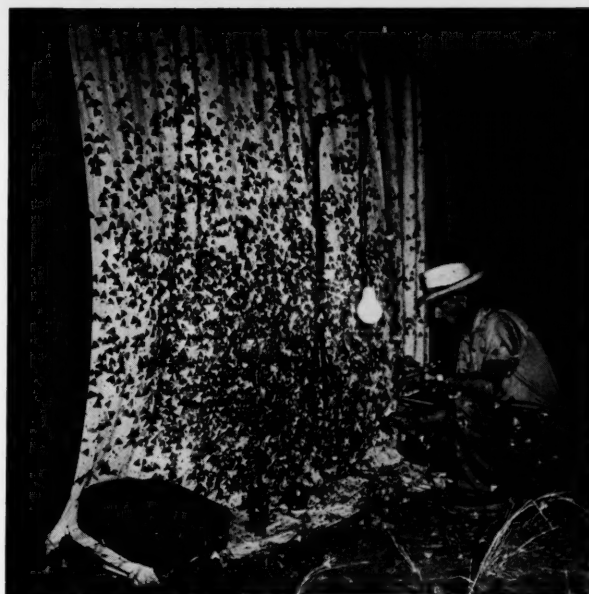
It was at this point that Mr. Davis reluctantly returned to San Francisco. Dr. Ross went on to the northwestern part of the island with its unique deciduous forest, where collecting was excellent; and lastly, to the arid southern end of the island which is noted for its peculiar flora of strange and odd desert plants.

After two months in Madagascar, Dr. Ross chose the long way home: the next destination was Nairobi, the Coryndon Memorial Museum and further collecting of East African Embioptera. Then, on to Addis Ababa, Ethiopia, where Dr. Ross visited various significant life zones including low rift valley localities.

The next lap was by Land Rover from Addis Ababa to Asmara (look at your map of Africa and realize what a trip *this* was!) and the Red Sea lowlands near Massawa. The zig-zag return route continued: by plane to Khartoum and Athens. (One of Dr. Ross' most vivid memories is seeing snow-covered Mount Olympus at dawn.) And on to Rome.

In Rome, he changed planes for Barcelona where he visited entomologists of the Museo de Zoologica; then by train to Zaragoza and a successful search for the famous Navás collection of neuropteroid insects which contained a particularly important group of embiid types, and finally back to London and the British Museum for further study and a lecture to the Museum staff.

February 1960 found Dr. Ross returning by jet to the United States, with hundreds of photographs, reels of



color motion picture film, many specimens of Embioptera, copious notes and drawings, and more than 50,000 specimens of all insect groups.

Dr. E. S. Ross
on night shift,
Madagascar

THE FOLLOWING is an abridged version of an epistolary exchange between *Time Magazine* and John Thomas Howell of the Academy's Department of Botany:

December 9, 1959

Dear Sirs:

The members of the California Botanical Club of the California Academy of Sciences of San Francisco were much perturbed to see an article in the November 23 issue of *Time* which had placed a Sequoia in an Amazonian jungle, where it never was and never could be. (The Sequoia is an endemic of California.)

Sincerely yours,
/s/ John Thomas Howell

December 17, 1959

Dear Mr. Howell:

Your recent communication has been received and forwarded to the editors concerned. You will hear from us again at a later date.

Cordially yours,
For the Editors

January 15, 1960

Dear Mr. Howell:

. . . You are, of course, quite correct. *Time* erred in identifying the tree in our photograph as a sequoia. Our original Rio source was a government technician who saw only the black and white contact prints. In rechecking, we were told (by another technician) that our tree is a *ceiba pentandra* garden of the *Bombacaceae* family which is not related to the sequoia. . . .

Cordially yours,
For the Editors

The correspondence ends here.

However, according to T. H. Huxley, "Time, whose tooth gnaws away everything else, is powerless against truth." The identification should read ". . . *Ceiba pentandra* Gaertner of the *Bombacaceae* family. . . ."

Four out of four. No hits, all errors.

H. R.



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